METAL FINISHING

PUBLISHED FOR THIRTY-SEVEN YEARS AS METAL INDUSTRY

LOCKHEED P-38 LIGHTNING

Dec. 30

Everyday, this fast, hard-hitting fighter is in the news. It's doing a swell job at all the fronts . . . on the production side, it may be of interest to know that countless parts are being burred, polished or buffed by LEA Flexible Methods, utilizing LEA Materials.

THE LEA MANUFACTURING CO.

WATERBURY 86, CONNECTICUT

S-LM-4

Burring, Buffing and Polishing . . . Specialists in the Development of Production Methods and Compositions

GUST, 1943—41st YEAR

AUG 21 1943

Preparing Fuze Parts for Zinc Plating

A typical example of a Specialized cleaning job . . . . Process developed exclusively by CLEPO Laboratories

Before Cleaning

FIRST Step in CLEPO Cleaning Process

SECOND Step in CLEPO Cleaning Process

THIRD and Last Step in CLEPO Cleaning Process

Fuze parts are typical of steel parts covered with scale and oil which must be cleaned oxide-free and water-break-free prior to zinc or cadmium plating.

This 3-step method is readily adapted to either hand cleaning or automatic cleaning cycles requiring a maximum of 3-minute cleaning time.

If you have a problem of a similar nature, wire us, and we will put you in immediate contact with our local Clepo service man.

Buy War Bonds and Stamps

FREDERICK GUMM

Chemical Company

538 FOREST STREET, KEARNY, N. J.

Ebonol "C"

Patent Pending

BLACKENS AND PROTECTS

This is the black for copper and its alloys that lasts and protects. Ebonol "C" blackened copper withstands up to 20 hours in salt spray unoiled and up to 200 hours when oiled. It is adherent and ductile --- easy to apply. Copper plated steel, when Ebonol "C" treated, affords much greater protection to the base steel especially when oiled.

Ebonol "C" is the ideal process for blackening copper, brass and bronze. It is widely used and war approved.

The above steel panel was copper plated 0.0002" thick. Half was Ebonol "C" treated and the whole panel was oiled. The unblackened section rusted at 16 hours and was badly rusted after 200 hours in salt spray. The Ebonol "C" treated half was almost perfect after 200 hours.

OTHER EBONOL BLACKENING PROCESSES

Ebonol "A" for Aluminum
Ebonol "S" for Steel and Iron
Ebonol "Z" for Zinc and Zinc Alloys

THE ENTHONE COMPANY

NEW HAVEN, CONNECTICUT

REPRESENTATIVES IN PRINCIPAL CITIES

BETTER GRIPPAGE

of protective coatings on aluminum and magnesium alloys

assured by thorough OAKITE DEGREASING

WHETHER you are anodizing aluminum . . . or applying Dow surface treatments or other protective coatings on magnesium parts . . . ADHESION and DURABILITY of the finish depend FIRST and foremost on surfaces being CHEMICALLY CLEAN.

Specialized Oakite degreasing materials are available to HELP YOU meet these wartime needs. They completely remove dirt, grease, fabricating oils and other foreign matter that may impair continuous bond and uniformity of the finish. As microscopic examination will show, these fast-working materials help assure protective coatings of maximum effectiveness.

Moreover, unlike sandblasting, wire brushing or other mechanical practices, Oakite cleaning materials do not etch, pit or abrade surfaces. SAFE, EASY, SIMPLE to use, they are proving a significani factor in saving urgently needed time and stepping up output on production lines across the Nation.

40 - Page Manual *FREE!*

Production finishing executives in aviation, accessory manufacturing and other metal-working plants will find this manual of unusual help in expediting ALL their degreasing and related operations. Write for your FREE copy of this helpful, informative booklet TODAY!

ASK US FOR DATA ON STRIPPING ANODIZING FILM FROM WORK RACKS

Because it quickly strips all insulating anodizing film from work racks and restores full electrical conductivity without harming the base metal or causing dimensional changes, Oakite Compound No. 84 makes possible longer working life of racks. It is equally effective for easily, speedily reclaiming rejected anodized parts. Complete details FREE on request.

Manufactured only by

OAKITE PRODUCTS, INC., 18 Thames Street, NEW YORK 6, N. Y.

Technical Service Representatives in All Principal Cities of the United States and Canada

OAKITE CLEANING

MATERIALS . . METHODS . . SERVICE

FOR EVERY CLEANING REQUIREMENT

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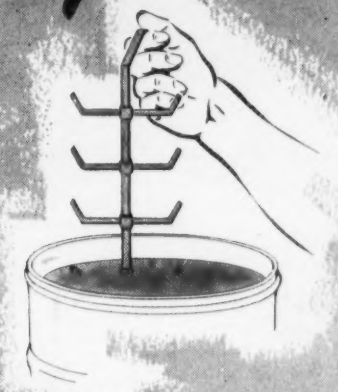
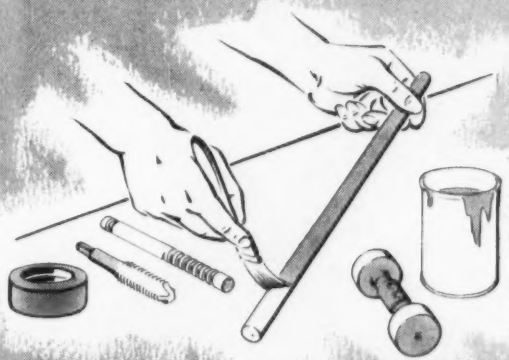
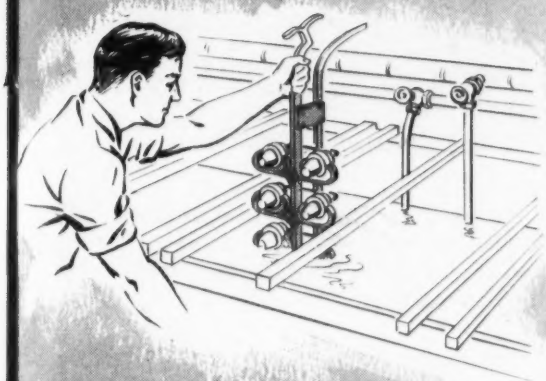
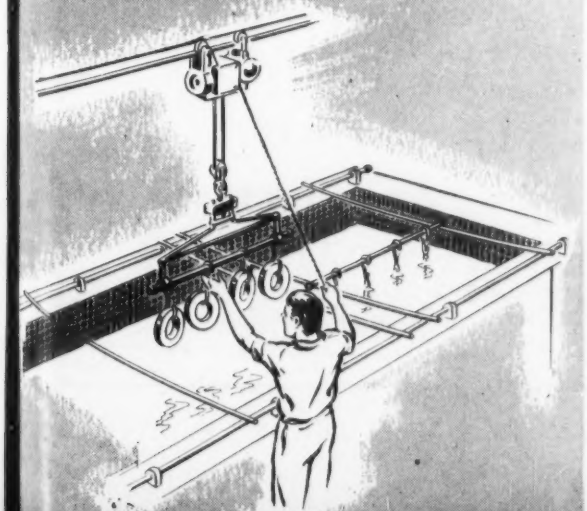
Top Plating Production









. . . when you get the right

UNICHROME INSULATION

for every stop-off and rack coating job!

RIGHT NOW, when you're driving equipment and platers to the limit, it's more important than ever to use insulating and stop-off materials that will safeguard every gallon of solution, every pound of metal, every priceless man-hour and finished part.

Here are six tried and proven materials, each offering an unequalled combination of properties, each formulated to meet specific problems.

☆UNICHROME "AIR DRY" RACK COATING
— a tough, easy-to-use rack insulation that saves frequent recoating — withstands hot alkaline cleaners, acid dips, hard chromium solutions and chromic or sulphuric anodizing baths.

☆UNICHROME "QUICK DRY" STOP-OFF 322
— a fast-drying, resistant lacquer that speeds preparation and handling — specially compounded for cyanide copper and other plating work requiring an extremely adherent stop-off.

☆UNICHROME "QUICK DRY" STOP-OFF 323
— a fast-drying, resistant lacquer that speeds preparation and handling — specially compounded for Parkerizing, chromium and other plating work requiring a stop-off that can be peeled off after use.

☆UNICHROME RESIST SHEET AND ROD
— a solid insulating material that is readily fabricated and extremely resistant to all plating room chemicals — specially suitable for constructing composite plating racks, stop-off shields, insulating gaskets and lattices for preventing short circuits in anodizing tanks.

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— a solid, wax-like formulation that saves preparation time in stopping off complicated shapes — suitable for work requiring resistance to boiling hot cleaners, acid dips and high temperature plating solutions.

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— a heavy-bodied, resilient insulating lacquer that has excellent all-round chemical resistance — for hard chromium and Parkerizing work requiring a stop-off that can be peeled off after use.

For Further Details — or an initial order, write briefly stating your problem and the work for which the stop-off or the insulation is intended.

☆ Trade-mark Reg. U. S. Pat. Off.

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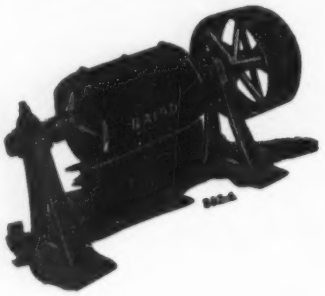
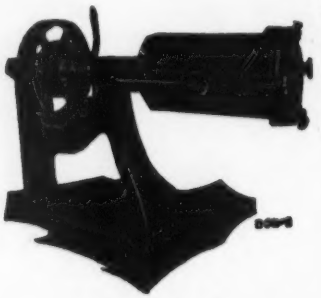
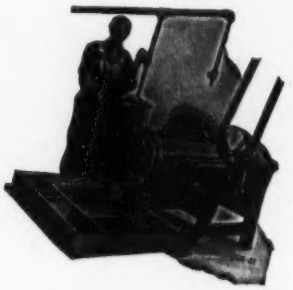
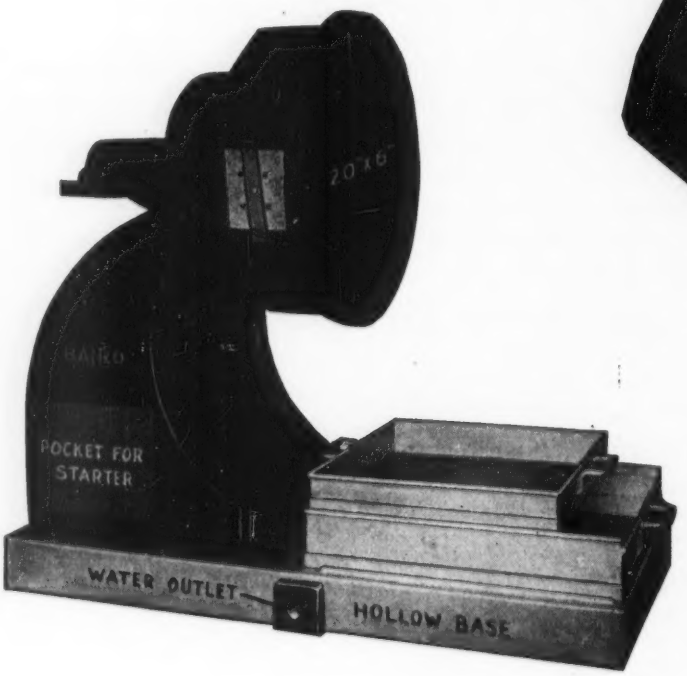






HORIZONTAL BARRELS

TILTING BALL BURNISHING BARRELS

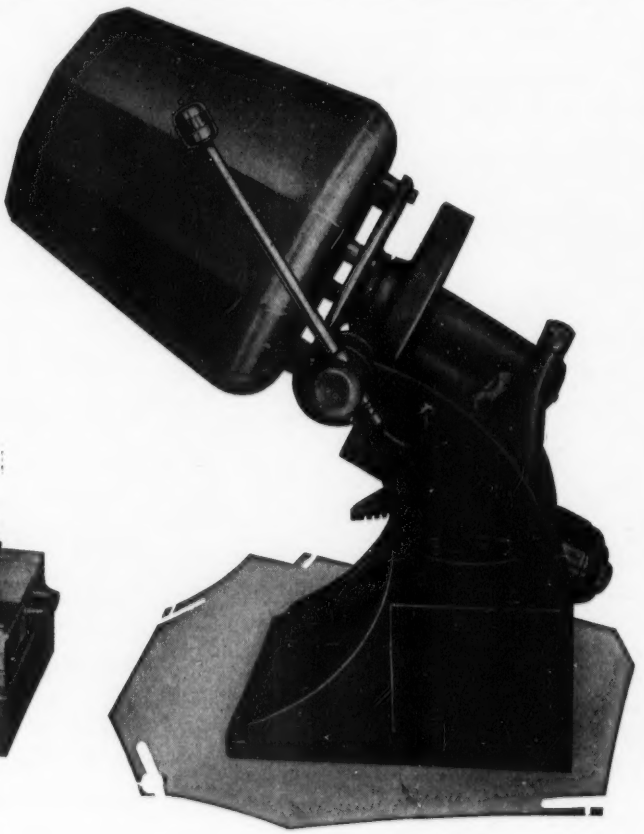


This shows a High and Narrow Type of Barrel mounted on "Baird" Model D. or Pedestal Type Motor driven Oblique Tilting Tumbler.

As shown the barrel was lined for use for burnishing with hardened steel balls.

These barrels may be of any suitable material depending on the job. Cast iron or fabricated steel unlined or lined with rubber etc. for rolling in abrasives.

Made in 20" dia. x 6" for No. 1 Tumbler
Made in 24" dia. x 8" for No. 2 Tumbler



This shows the side of a No. 1 BAIRD Model D. Single Oblique Tilting Tumbler with a No. 22 Sheet Steel Polygonal Barrel and with an Automatic Electrical Tilting Device.

This device AFFORDS GREATEST SAFETY — LEAST LABOR — LEAST FLOOR SPACE—LEAST AMOUNT OF DISTANCE TO MOVE WORK in USING the tumbling barrels. SAVES TIME AND FLOOR SPACE.

When tumbling questions come up "ASK BAIRD ABOUT IT"

AUTOMATIC MACHINERY BAIRD STRATFORD CONNECTICUT, U.S.A.

THE BAIRD MACHINE COMPANY

STRATFORD 9, CONNECTICUT

Since 1846 specializing in high production machinery for articles of wire and for ribbon metal. Also machines to turn, bore, etc., castings, forgings, etc., up to 10½" diameter.

DO YOU KNOW THAT---

There's a special Wyandotte Metal Cleaner for the anodic cleaning of bearings prior to silver deposition?

This special Wyandotte Product *contains no silicate,* rapidly removes carbon smut, and is free rinsing. Users tell us "that it leaves an ideal surface for silver strike."

Details regarding the use of this Wyandotte Product for cleaning prior to plating silver on bearings will be sent to you promptly.

There is a specialized Wyandotte Metal Cleaning and Degreasing Product for every war production metal cleaning job. Located near you is a Wyandotte Field Engineer with a wealth of "know how" about metal cleaning that is yours for the asking.

SERVICE REPRESENTATIVES IN 88 CITIES

WYANDOTTE CHEMICALS CORPORATION

J. B. FORD DIVISION • WYANDOTTE, MICHIGAN

• *Wyandotte Chemicals Corporation consolidates the resources and facilities of Michigan Alkali Company and The J. B. Ford Company to better serve the nation's war and post-war needs.*

PHOSPHATIZING FOR AIRCRAFT MAINTENANCE

TURCO

W.O.#1

destroys rust — forms lasting bond with paint

As a rapid, low-cost method of surface preparation for parts too large for tank immersion, PHOSPHATIZING is particularly adapted to aircraft. Assembled planes can be treated by this process, as well. For touch-up work, it is equally desirable.

TURCO W.O. No. 1 is government approved and unexcelled for aircraft phosphatizing operations. It provides the required passivation for aluminum and aluminum alloy surfaces. It works effectively on zinc die castings, cadmium, steel and other metal surfaces, as well.

W.O. No. 1, provides maximum adhesive qualities to paint or other finishes and inhibits rust so oxidation at any exposed area cannot possibly progress. It is extremely durable. So anchors paint that it will not crack or flake, and forms an integral part of the metal surface when dry.

W.O. No. 1 is faster, safer and more economical. It can be hand-swabbed or sprayed on. No tanks or other special equipment necessary. Requires only a few minutes to passivate the surface which forms a tight, permanent bond for paint.

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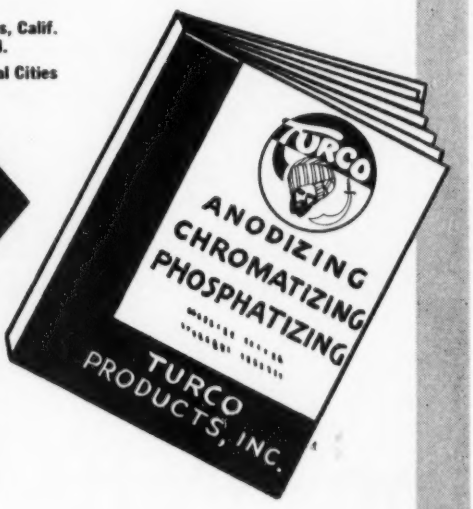
60-Page Illustrated Book Free
"ANODIZING, CHROMATIZING, PHOSPHATIZING"



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Please send 60-page free booklet "Anodizing, Chromatizing, Phosphatizing."

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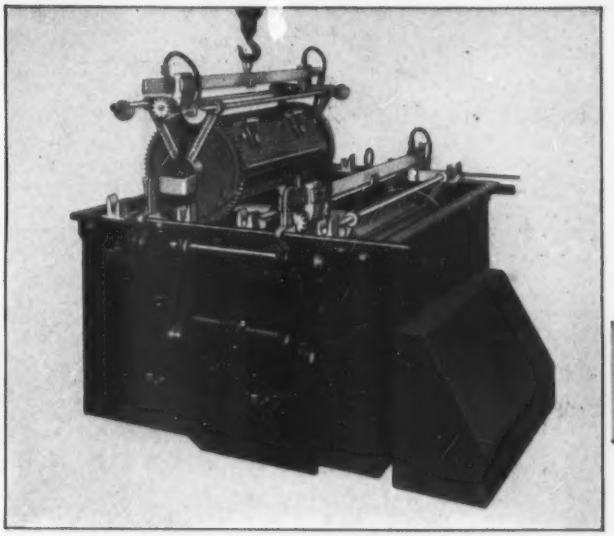

Twin Unit
Barrel Plater

For Faster, More Uniform Plating and Lower Maintenance Costs—

Specify LASALCO

Multiple Unit Barrel Platers

★ The Lasalco Platers are designed to give a maximum of production with a minimum of labor — and that's important today when every hour gained will shorten the war. Lasalco Multiple Plating Units can increase the amount of production per man-hour.

Because these machines are ruggedly and carefully built under rigid specifications, they will stand up under today's 3-shift production with practically no time out for maintenance.

Get complete information on these platers and other Lasalco plating and finishing room equipment and supplies by calling in a Lasalco Engineer.

LASALCO, INC.

2818-38 LaSalle Street
St. Louis, Missouri

MILLIONS

. . . of small parts such as these, lead plated in our plant, are meeting the tests of war service on land, at sea, and in the air.

STEEL PROTECTION & CHEMICAL CO. INC.

★ ★ MOORESVILLE, INDIANA ★ ★

If you need prompt, dependable, metal finishing information, call on Udylite. No organization in the country is better qualified to give you advice in plating, polishing or anodizing, gained through years of practical application, in all sorts of installations under every type of conditions.

Udylite maintains a large staff of experienced Metal Finishing Engineers and Electrochemists, whose consultation and advice is available to Udylite customers. These men know their business thoroughly and they can help you plan a new installation or revise your present one for greater efficiency.

Udylite has a complete line of metal finishing equipment, second to none in quality and performance. Special equipment will be designed and built to your requirements.

Udylite offers a complete line of best quality supplies, from **A**cids to **Z**inc anodes.

Call on Udylite for your Metal Finishing needs. You pay nothing extra for Udylite's "Know How."

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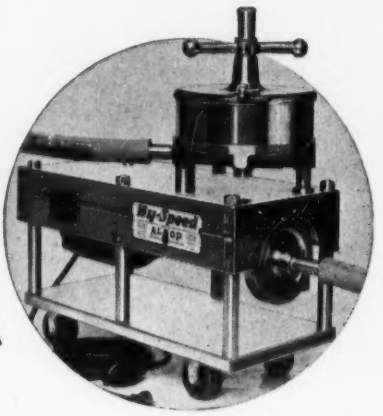
Alsop

Hy-Speed

FILTER EQUIPMENT *for* PLATING SOLUTIONS

The above headline is from the cover of the most popular book on the filtration of plating solutions. The benefits to be derived by "Sealed Disc" filtration, an explanation of the most unusual filtration principle used, and illustrated thruout with various types of filters.



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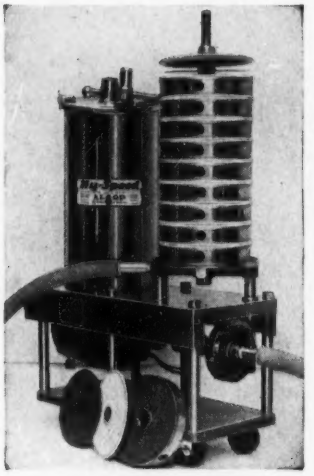

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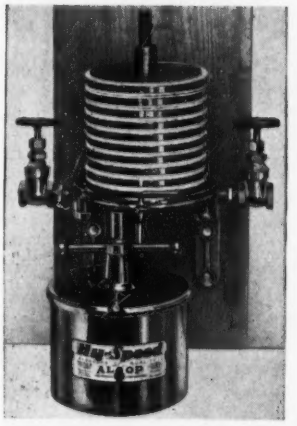


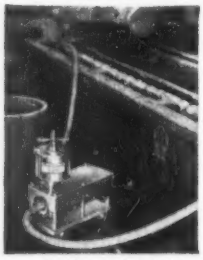
C

Alsop "*Sealed Disc*" Filters

ARE THE SELECTION OF FAR SIGHTED PLATERS

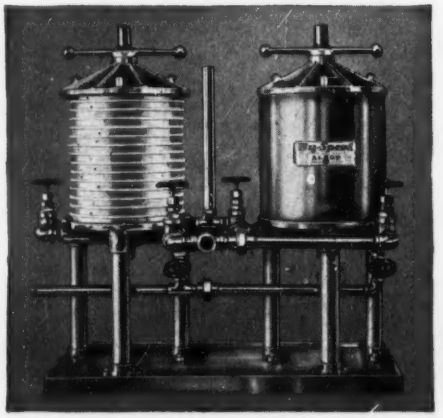
They know that by keeping their solutions perfectly clean of all dirt, dust, and the impurities present in materials used, they will produce finer plated surfaces, cut down rejects, and increase their production.

The illustrations shown at right are a few of the many types made. (A) is a small portable, (B) is a portable of greater filter area and therefore capacity, (C) is a pipe lined connected type for water, oils, etc., (D) is a multiple type filter for large capacity filtration. This can also be furnished in portable type.



A "Sealed Disc" Filter in action.

If you would like a copy of our book it will be sent. A post-card will bring it.



D

ALSOP ENGINEERING CORP.

28 Bright Street **Milldale, Conn.**

TO MEET Any DEBURRING or BUFFING Requirement

DEBURRING OPERATIONS

ON STEEL PARTS

On steel parts, on buffs, *Stevens Greaseless Burring Compound* works fast, enables the operator to remove burrs without damaging accurate parts, maintains close tolerances, leaves the work clean and free from grease. Three Grades—Coarse, Medium and Fine.

ON NON-FERROUS PARTS

On non-ferrous parts, *Stevens Tripoli Composition No. 70* works fast, easy to clean, permits accurate work, costs less than Greaseless Compounds.

BUFFING OPERATIONS

ON STEEL PARTS

On steel parts: To remove tool marks, grinding lines, pits, scratches, and other surface imperfections, *Stevens Greaseless Compounds* cut fast, bring up a "satin"-type finish, leave the work clean and free from grease.

As an alternative . . . *Stevens Steel Composition No. 427* works fast, brings up a clear, high finish, leaves parts easy to clean.

ON NON-FERROUS PARTS

On non-ferrous parts: *Stevens No. 70 Tripoli*—also other grades are offered to meet unusual operating requirements of speed, pressures, etc.

ON PLASTICS

On plastics: *Stevens Plasticut* for Buffing, *Stevens Plasticolor* for finishing, and *Stevens No. 16* Black for dark colored plastics, bakelite, etc.

For Tampico Wheels and Brushes—Stevens Tampico Composition adheres to the tampico, insuring fast and accurate work on de-burring or other operations, maintains close tolerances, saves tampico—and is easy to clean.

FREDERIC B. STEVENS, INC.

DETROIT, MICHIGAN

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"EVERYTHING FOR THE POLISHING AND PLATING PLANT"

DU-LITE *leads again . . .*

The most important recent improvement in the black oxide process for steel finishing is the Du-Lite method of removing foreign material from the processing bath and keeping it clean.

The Du-Lite Clarifier can positively control the accumulation of sludge in the bath, either in the form of a solid or in suspension. Uniformly high quality finishing is impossible where sludge is present.

Our guarantee of freedom from this trouble is one reason why leading manufacturers look to Du-Lite for the right black oxidizing process.

Our representatives are located in the principal industrial centers and are available for consultation without obligation. Write the nearest office.

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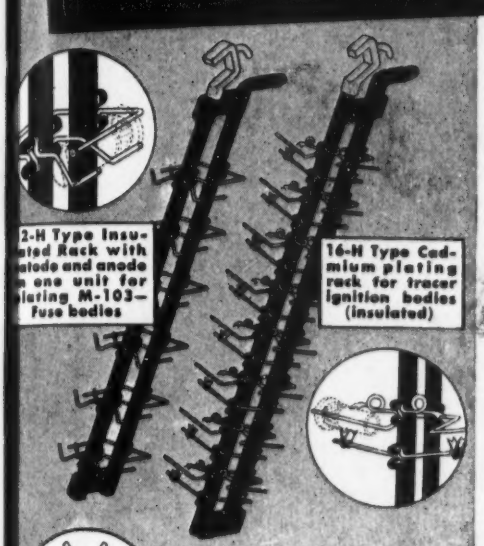
Insist On Genuine

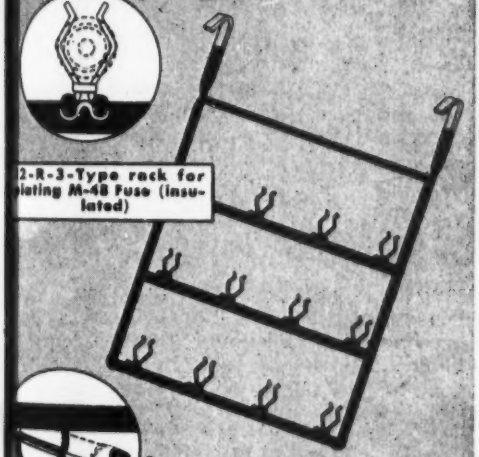
BELKE PLATING RACKS

New — Wonderful Synthetic Insulation

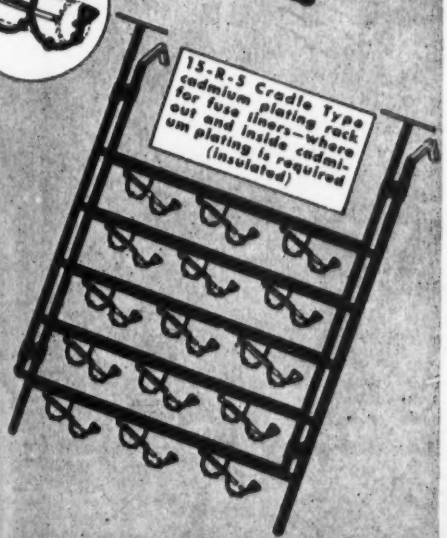


2-H Type Insulated Rack with anode and anode in one unit for plating M-103—Fuse bodies

16-H Type Cadmium plating rack for tracer ignition bodies (insulated)



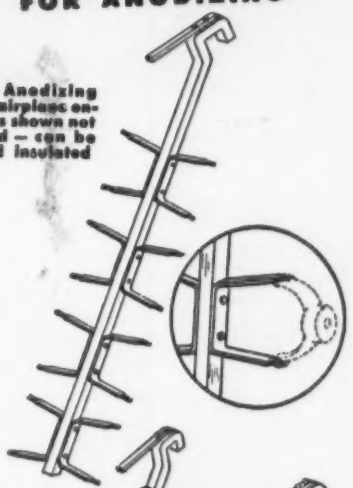
2-R-3-Type rack for plating M-48 Fuse (insulated)



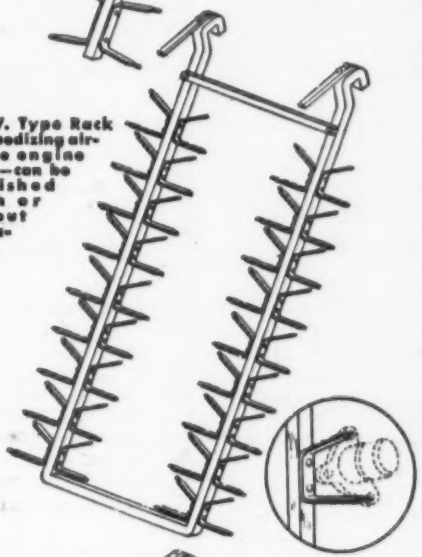
15-R-5 Cradle Type cadmium plating rack for fuse liners—where out and inside cadmium plating is required (insulated)

FOR ANODIZING

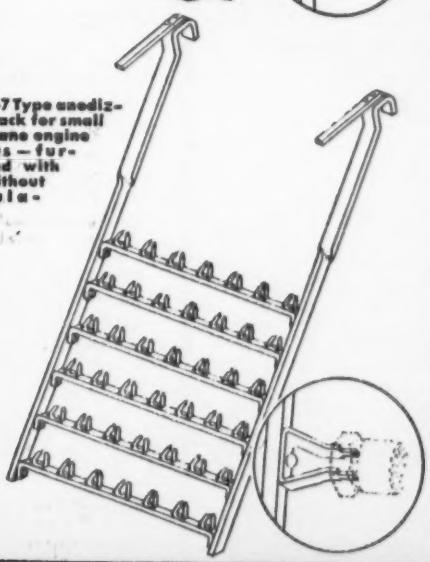
8-H Type Anodizing Rack for airplane engine parts shown not insulated — can be furnished insulated

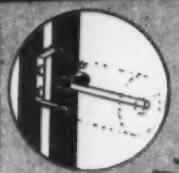


36-LV. Type Rack for anodizing airplane engine parts—can be furnished with or without insulation

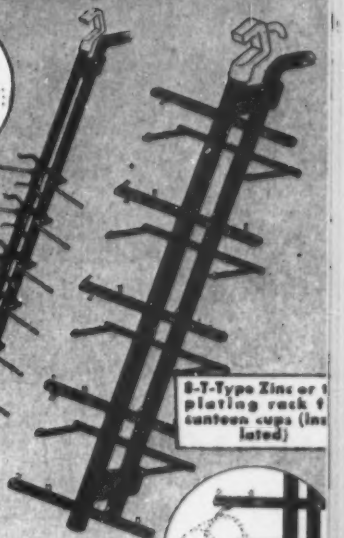


42-R-7 Type anodizing rack for small airplane engine parts — furnished with or without insulation



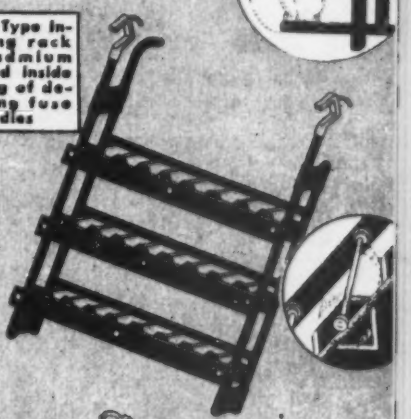


12-H Type rack for cadmium plating M-103 Booster cases (insulated)

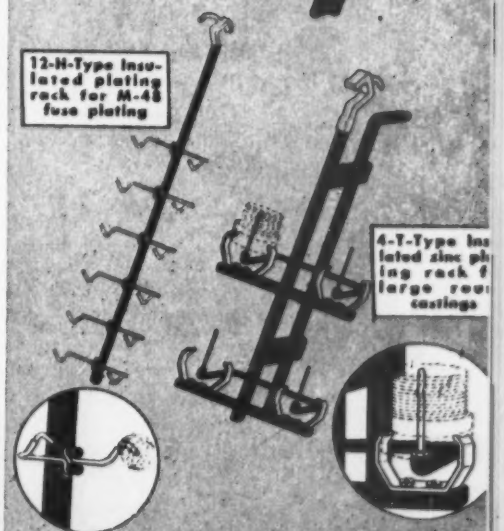


8-T-Type Zinc or t plating rack f canteen cups (ins lated)

30-R-3 Type insulating rack for cadmium out and inside plating of detonating fuse bodies



12-H-Type insulated plating rack for M-45 fuse plating



4-T-Type Ins lated zinc pl ing rack f large rou castings

BELKE MANUFACTURING COMPANY
947 NORTH CICERO AVENUE · CHICAGO

Plating Zinc?
—Cadmium?

CAUSE ENOUGH

FOR CONFIDENCE

when you need anodes or chemicals

Actually, there is only one sure way for platers to judge an anode. That's by *using* it. Today you can't afford to take the time to run comparison tests on any of the materials you use. But you can be sure of top grade anodes and chemicals if you are sure of the maker.

Because of year-after-year performance, Harshaw plating materials have won a reputation for giving results. If dependable uniformity and rigidly-held, high manufacturing standards are responsible for that reputation, we intend to keep right on deserving it.

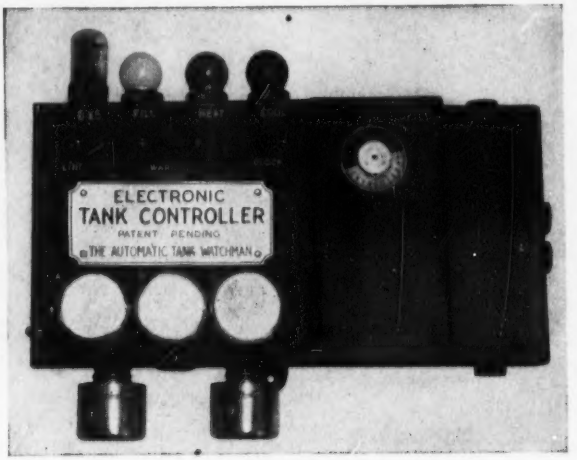
That's why we say that when you see the Harshaw name on the anodes in your tanks, or on the drums, barrels, bags, or carboys in your shop, it is cause enough for confidence.

SHAPED FOR YOUR SHOP

Made to pre-war standards by experienced men, Harshaw ball anodes never have to be jammed into your baskets. Fins and sprues are carefully removed. Harshaw ovals, flats, etc., are available in any commercial shape as well as the standard size, 1¼" thick by 3¼" wide for soft metals.

THE HARSHAW CHEMICAL CO.
1945 East 97th Street, Cleveland 6, Ohio
BRANCHES IN PRINCIPAL CITIES

Save MANPOWER with this New *Electronic* TANK WATCHMAN



New *Automatic* Tank Control Hailed by Plating and Finishing Industry

A long-felt need, and especially valuable in these days of labor shortages and inexperienced help, this new "Automatic Tank Watchman" provides positive control of solution levels, temperature and time.

Outstanding Feature at Electroplaters' Convention

One of the most-talked-of exhibits at the recent Buffalo Convention, the Electronic Tank Controller was the center of interest activity at all times. Years of practical experience in the plating industry, plus months of painstaking proving, guarantee its perfect performance.

Requires No Major Reconstruction

Can be attached to your present equipment at small expense. Will . . .

1. **Keep tank at constant level**
2. **Maintain solution at correct temperature**
3. **Warn operator of any leaks or over-filling**
4. **Not operate from waves**
5. **Prevent imperfect work**
6. **Automatically start and stop tanks. Can be set for full week schedule**

Practically fool-proof, the Electronic Tank Controller works "without pay." Can be immediately installed by your own electrician on any type of tank without boring holes or making major changes. Guaranteed to perform all the duties we claim, without fuss or bother.

Write today for folder of complete details of all models and prices

Plating Processes Corp.
HOLYOKE MASSACHUSETTS

Don't Be Confused!

Roto-Finish

Is Not the Ordinary

Tumbling Method of

DE-BURRING
HONING
GRINDING
BUFFING
POLISHING

●

IT'S PROVEN
★
EFFICIENT
★
ECONOMICAL

and it's ***READY!***

It is a NEW and UNIQUE method which accomplishes almost unbelievable results.

Roto-Finish enables you to handle fine precision work on parts for airplane engines, machine guns, and countless other war production parts.

With Roto-Finish thousands of parts—small or medium—can be deburred, buffed, polished, and colored, either before or after plating, thus cutting down costly hand production methods.

Finishes preparatory to plating are obtained which are fully comparable to hand-buffed operations.

Write for illustrated folder and name of our nearest distributor. A representative will gladly call and explain Roto-Finish to you.

ROTO FINISH
STURGIS PRODUCTS CO. REG. U.S. PAT. OFF.

THE STURGIS PRODUCTS CO.

MECHANICAL FINISHING MACHINERY AND SUPPLIES

STURGIS • MICHIGAN

Pure WATER FOR PLATING

at a fraction of former costs!

De-ionized water (comparable to distilled water, but at a fraction of its cost) in plating solutions and in pre-rinse tanks eliminates the troubles due to mineral salts in water supply. Ion-exchange resins can also be used to reclaim precious metals now being washed away in solution. Pioneers in the manufacture of De-ionizing equipment, ILLCO has been called on to supply pure water in a number of plating departments and users are enthusiastic about results. . . . Without *heat*, without fuel, ILLCO-WAY De-ionizing units are daily producing pure water to meet exacting industrial and technical standards in leading U. S. plants.

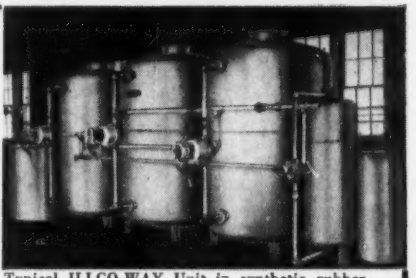
NEW CHEMICAL METHOD REPLACES DISTILLED WATER! This modern, economical method is based on ion-exchange, and uses Amberlite resins. Cost of the treated water is remarkably low—only a few cents per thousand gallons. . . . Learn how ILLCO-WAY equipment can speed production, help cut costs in *your* plant! Write for literature today!

TESTED IN THE LABORATORY — ILLCO-WAY — APPROVED IN THE FIELD

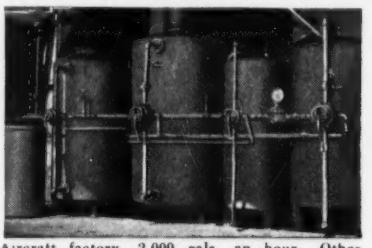
ILLINOIS WATER TREATMENT CO.

Water Treatment Engineers

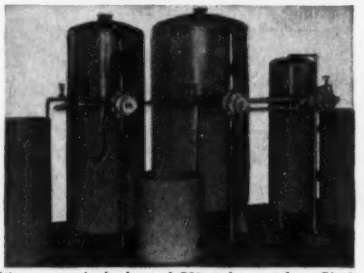
856 CEDAR STREET
ROCKFORD • ILLINOIS



Typical ILLCO-WAY Unit in synthetic rubber plant. Capacity: 4,500 gals. De-ionized water an hour.

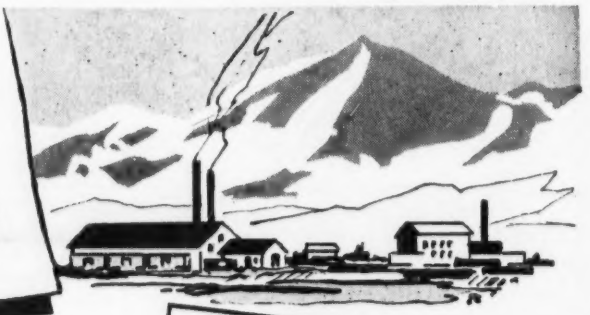


Aircraft factory, 2,000 gals. an hour. Other units have permissible flow of from 100 to 50,000 gals. per hr.



Pharmaceutical plant, 1,700 gals. per hr. Similar equipment used for plating and anodizing.

A PUMICE TO MEET EVERY NEED



Not until Valencia — the standard of American Pumice— was discovered at Grants, New Mexico, was it thought that a domestic pumice could match the quality of imported Italian Pumice. This inexhaustible deposit at Grants is true pumice stone and not a volcanic ash. It is physically and chemically equal in every respect to the now unobtainable Italian Pumice. • The Valencia plant's output of grades for every need is rigidly under control for particle size, purity, weight and color.

Check this table comparing Valencia with the highest grade of imported Italian Pumice. See for yourself that Valencia is truly the standard of American Pumice.

	American Pulverized Per Cent	Italian Select Per Cent
Silica	72.90	73.24
Alumina	11.28	10.61
Iron Oxide	.86	1.57
Titanium Oxide	.06	.10
Calcium Oxide	.80	1.10
Magnesium Oxide	.36	.40
Soda	3.64	3.03
Potash	4.38	5.58
Sulphuric Anhydride	.03	.05
Loss on ignition	5.20	4.04

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THE PUMICE CORPORATION *of* AMERICA
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FOR BETTER DUST SAFETY—
BETTER COMFORT TOO!

THE TRANSPARENT

Clear-Vue MODEL

DUSTFOE RESPIRATOR

With facepiece and filter container of strong, transparent plastic, you can see inside this modern respirator at a glance. Officially approved by the U. S. Bureau of Mines for All-Dust protection, the Clear-Vue Dustfoe is durable, odorless, non-corrosive, non-conductive of electricity or heat. Its transparent construction permits checking for cleanliness, proper insertion and seal of filter, etc., without disassembly, and the self-adjusting facepiece has a soft, molded face-cushion which provides maximum wearing comfort. Easily sterilized; all parts are interchangeable. Write for Bulletin No. CM-6.

M·S·A

Comfo

DUST RESPIRATOR

WITH PLASTIC FILTER CONTAINER

New plastic filter containers—thinner, with rounded edges—permit better downward and sidewise vision in the famous Comfo Respirator, *plus* even lower resistance to air-flow and improved appearance. Long a popular favorite in industrial service, the twin-filter Comfo is U. S. Bureau of Mines-approved for dependable dust protection—sturdy and durable for hard service. Flexible molded facepiece assures snug fit—simple to clean and sterilize. Ask for Bulletin No. CR-9.

Demonstrations Gladly Arranged on Request

MINE SAFETY APPLIANCES CO.
BRADDOCK, THOMAS AND MEADE STREETS
PITTSBURGH, PA.

*DUST and FUME CONTROL is a job for *ENGINEERING SPECIALISTS*

* If all dust and fume control problems were alike, there would be no need for specialized engineering service. But these problems vary widely, depending upon manufacturing processes and raw materials used, including many recently developed materials which present entirely new problems. For these reasons, selection of the *right* units for a really efficient dust or fume control system is definitely a job for *engineering specialists.*

The Kirk & Blum Engineering Staff, qualified by over 36 years of experience in this particular field, first makes a thorough analysis of your special dust or fume control problem. Next, our Staff selects the right units for your job from among the various makes available - - then designs and installs a complete system that is guaranteed by Kirk & Blum to give the results you want.

It just doesn't pay to take chances with a dust or fume control system that is "almost right." You don't have to risk being "sold" on units that are unsuited for your particular job. Play SAFE . . . get the unbiased counsel and planning of experts . . . Kirk & Blum Engineers. For details write to The Kirk & Blum Manufacturing Co., 2859 Spring Grove Ave., Cincinnati, Ohio.

KIRK AND BLUM
AN ORGANIZATION OF ENGINEERS AND MECHANICS

DARCO *Says,* "STOP!"
to Plating Solution "Immigrants"

Darco S-51 keeps unwanted "immigrants" out of plating solution ***continuously.*** Before grease, oil, soap, decomposition products and colloidal impurities can damage plating, Darco ***adsorbs*** them.

Ordinary periodic filtration may guard against readily visible suspended matter. But Darco stops even the insidious ***traces*** of impurities from causing trouble. The only way to prevent some of these traces from reaching the plating surface, is to catch them on the internal network surfaces of activated carbon. Darco does this.

Even with today's heavy schedules, leading plants are filtering with Darco S-51 with complete success. And Darco's continuous filtration permits much smaller dosages, because impurities are not allowed to build up.

Ten cents buys enough Darco to keep 100 gallons of solution clean for a week. Specify Darco.

The article, "Physical Removal of Impurities from Plating Solutions," discusses continuous filtration in detail. Write for a copy.

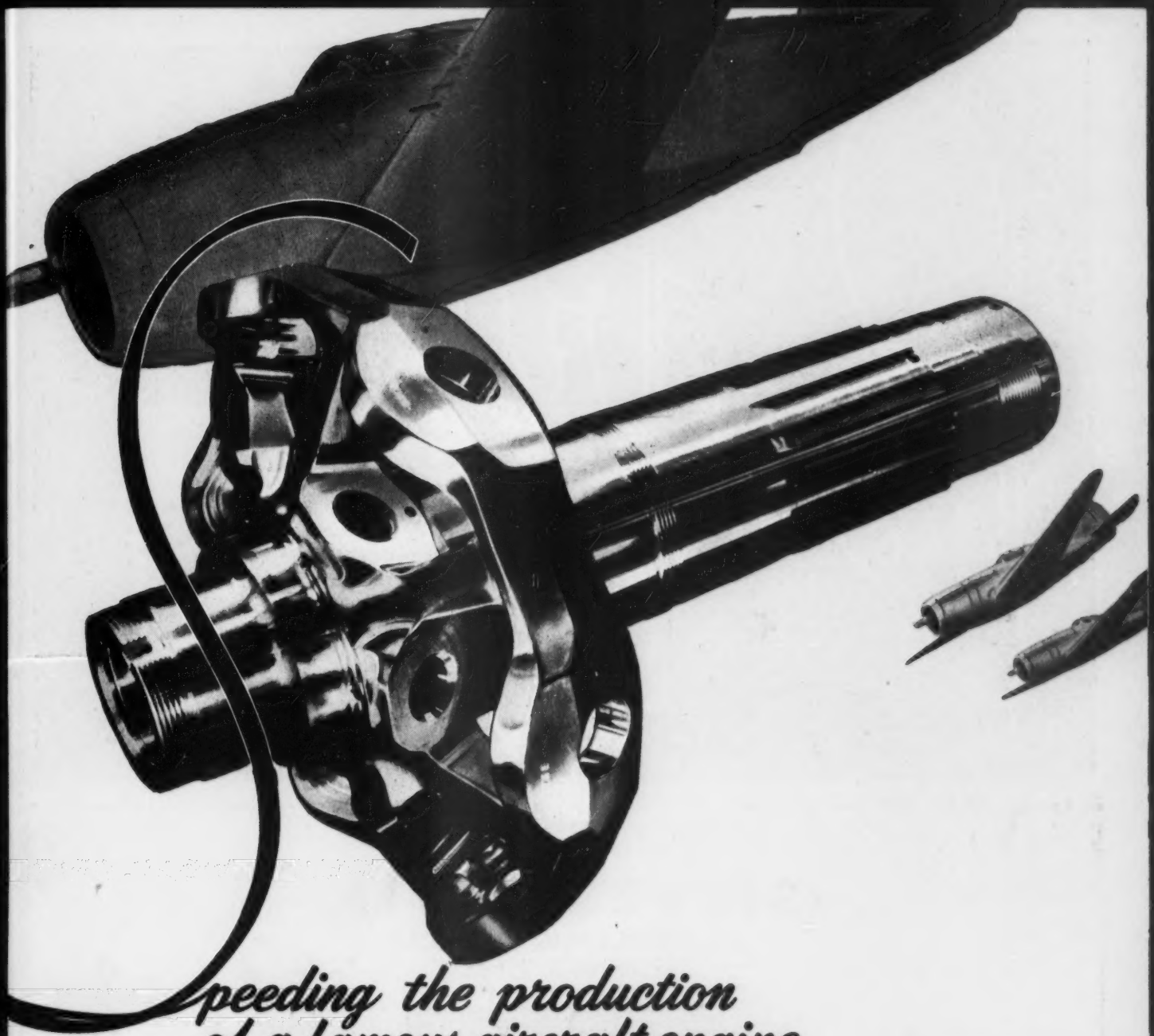
Current pressure to get work done means overloading the cleaning cycle, causing excessive greases, oils, etc., to be dragged over into the plating tanks. Darco helps meet this situation.

DARCO—Reg. U. S. Pat. Off.

DARCO

This trade-mark identifies the genuine. Accept no packages without it.

DARCO
CORPORATION
60 East 42nd Street, New York, N. Y.



Speeding the production of a famous aircraft engine

WITH PENNSALT CLEANER

A leading automobile manufacturer now making Pratt & Whitney aircraft engines had done a remarkable job of mechanical production . . . and was interested in stepping up the efficiency of the metal cleaning (chemical) operations.

A wide variety of steel and brass engine parts—including the polished steel propeller shaft illustrated—had to be cleaned of mineral cutting oil, black emery, or tallow polishing compound, prior to tin or cadmium plating . . . All work went through a solvent degreasing operation. Electro-cleaning, with two kinds of cleaners, was carried on in two crane operated tanks, with both direct and reverse current. But even with this cycle, cleaning of polishing compound was not complete.

A Penn Salt technical representative was able to do a real job of improving this method. He eliminated the solvent degreaser—and with the same Pennsalt Cleaner in each tank, he used it as both a soak-cleaner and electro-cleaner.

The resulting work was excellent. There were no rejects. The finish was judged to be the brightest ever obtained. Moreover, everybody in the plating room welcomed the elimination of the costly solvent degreasing operation.

What's *your* metal cleaning problem? Whatever the kind of metal or the type of material to be removed, you can benefit by the experienced advice of a Penn Salt technician. Let him tell you what the family of Pennsalt Cleaners is doing throughout industry today to save time, materials and labor. If you prefer, write fully to our Pennsalt Cleaner Division, Dept. MF.

PENNSYLVANIA SALT
MANUFACTURING COMPANY
Chemicals

1000 WIDENER BUILDING, PHILADELPHIA 7, PA.

New York • Chicago • St. Louis • Pittsburgh • Minneapolis • Wyandotte • Tacoma

Pentrate

PHYTANIUM BLENDED

the Modern Black finish for steel

If you don't know all about the Pentrate finish, its protective penetration, its rust-resistance, its friction-reducing qualities and its smart appearance, send for a copy of the new Pentrate book. It contains the whole story — probably a very valuable one for you. Address Heatbath Corporation, Springfield, 1, Massachusetts.

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Control Sets for

SILVER & TIN

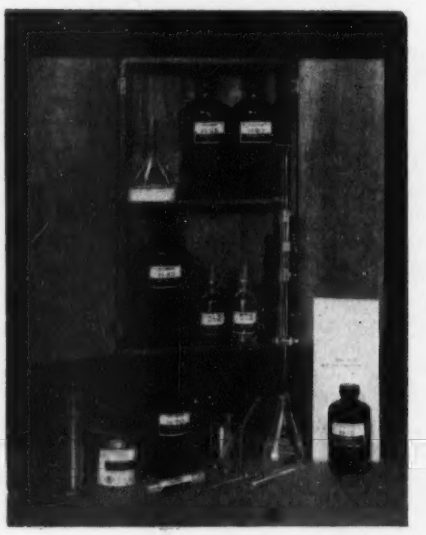
ELECTROPLATING SOLUTIONS
ARE NOW AVAILABLE

SOLUTION ANALYSIS

Our laboratory will analyze your solutions at reasonable rates.

Immediate, accurate report by Air Mail.

Write for price list.



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Solving the Man-Power Shortage
in POLISHING..BUFFING..
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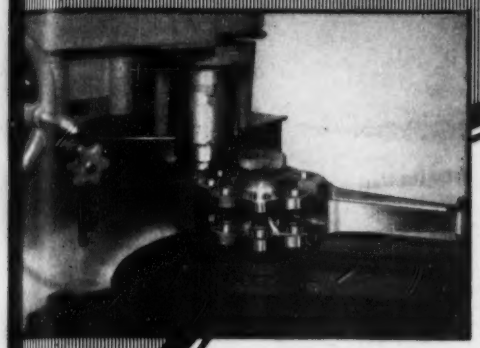
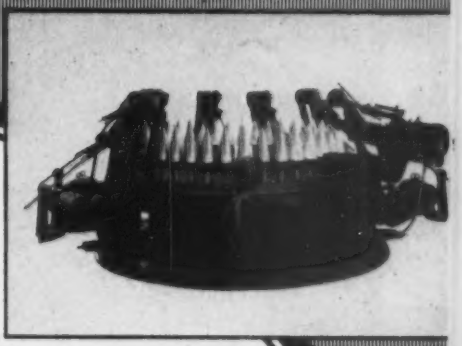
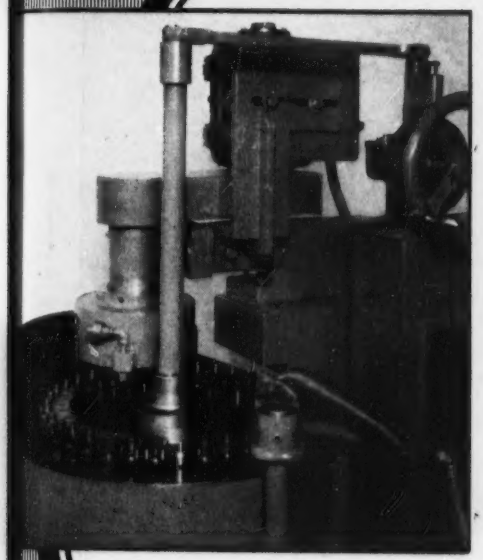


Special Acme Machine for polishing engine parts.

Special Acme Machine with 8 belt heads — for polishing tapered cylindrical parts. Multiplies daily production, with greatly reduced man-power.



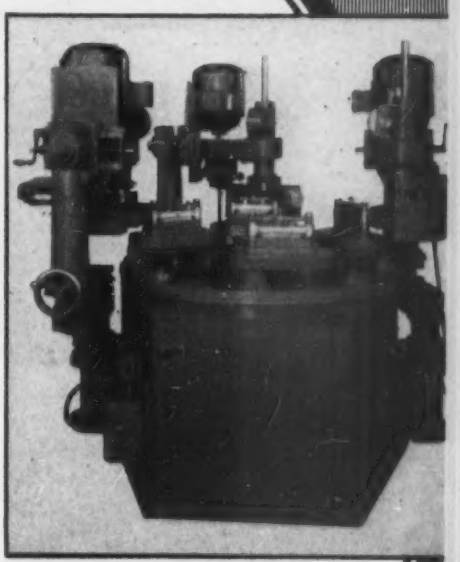


Keep Production Up

BY USING

ACME AUTOMATICS

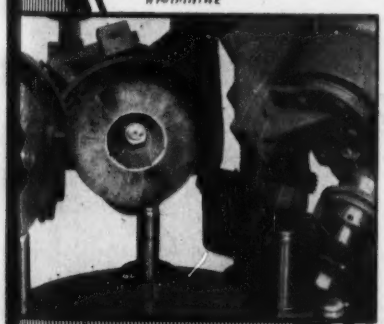
And Spreading Your Man-Power!



Special Acme Machine for grinding small mechanical parts—2000 per hour. Automatic wheel feed. Automatic diamond dresser. Automatic unloading

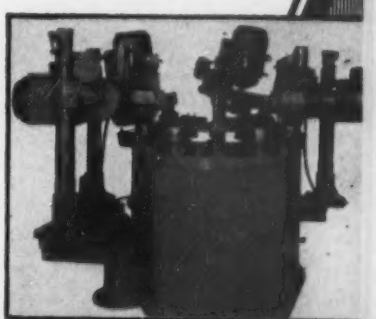
Special Acme Machine for blending the radius in washers—1200 to 1500 operations per hour.

Special Acme Machine for polishing and oiling aircraft parts.



Acme Rotary Machine for polishing, buffing and wire-brushing. Big savings in man hours.

Special Acme Machine for finishing pistons. Constructed to finish valve recess and avoid sluff marks.



ACME *Manufacturing Co.*

1642 HOWARD ST. • DETROIT, MICH.

Builders OF AUTOMATIC POLISHING AND BUFFING MACHINES FOR OVER 25 YEARS

INDIUM

Keep Your Eye on This Metal!

1 . . . as a worthy member of the plating metals group: chromium, nickel, cadmium, silver, etc.

2 . . . as a hardening element for non-ferrous metals

3 . . . as a protecting element against surface corrosion and discoloration

4 . . . as a contributing element in the field of high lustre finishes

Yes, keep your eye on INDIUM! It has already accomplished much in the decorative plating field. It bids fair to accomplish much more. And so little of it does so much. It's one of those "ounce" metals. While a large share of our production is now going to war purposes . . . the full story of which can be told later . . . we shall be glad to talk with companies in the plating field about the use of INDIUM for their work.

The INDIUM *Corporation of America*

UTICA, N. Y.

New York Office: 60 East 42nd Street

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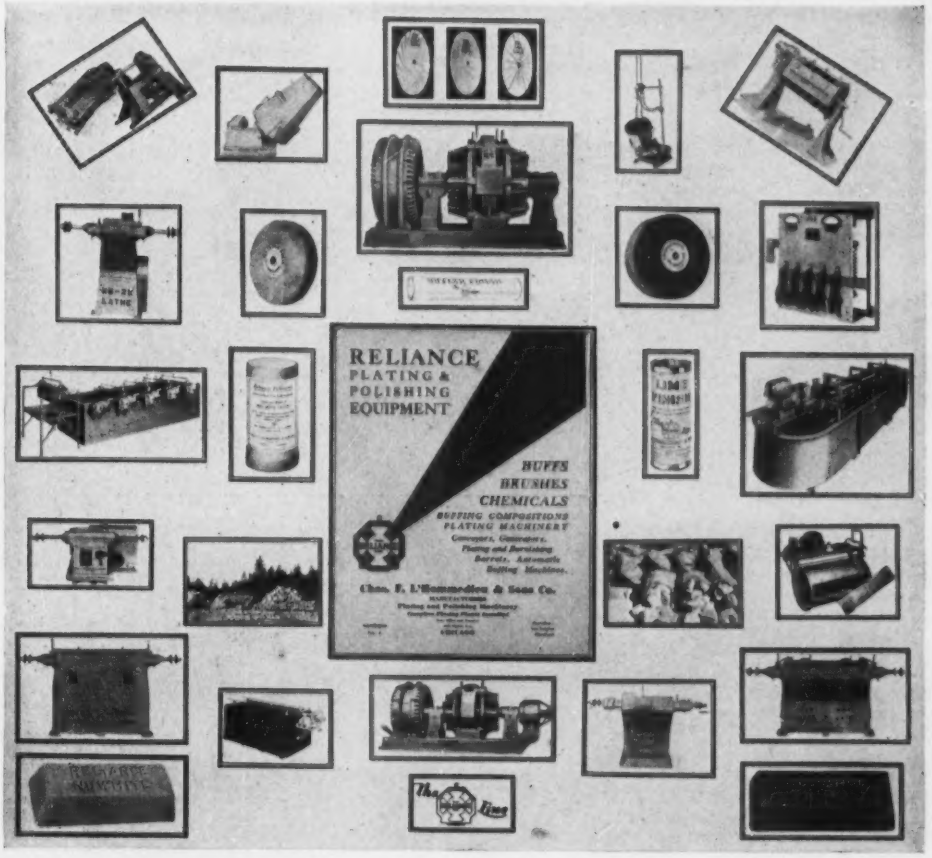
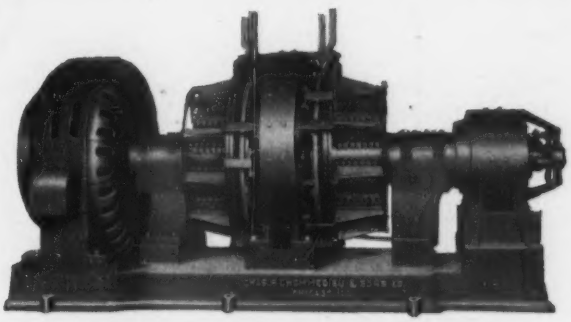


EVERYTHING FOR PLATING AND POLISHING



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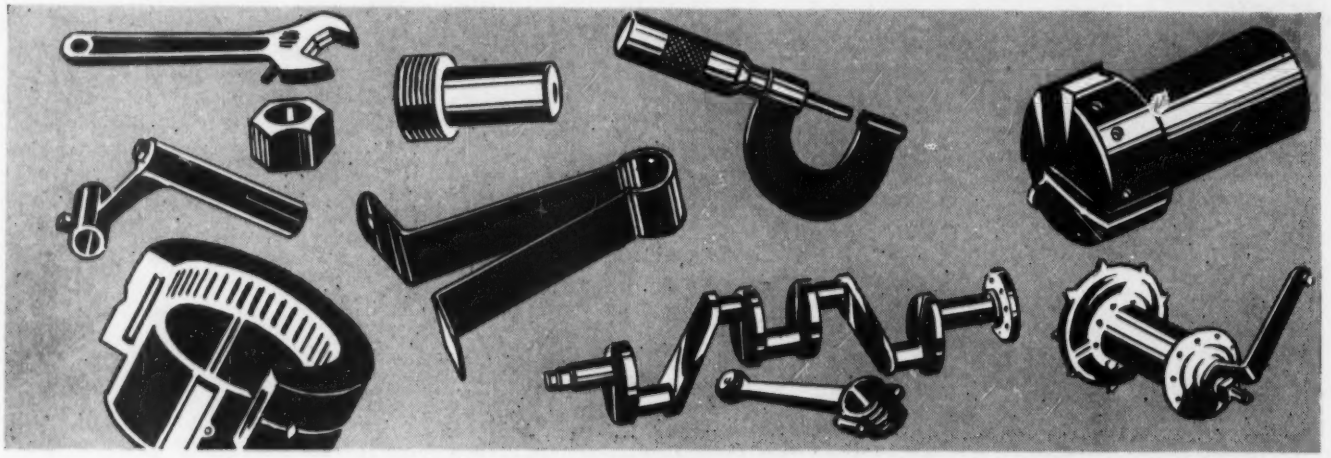
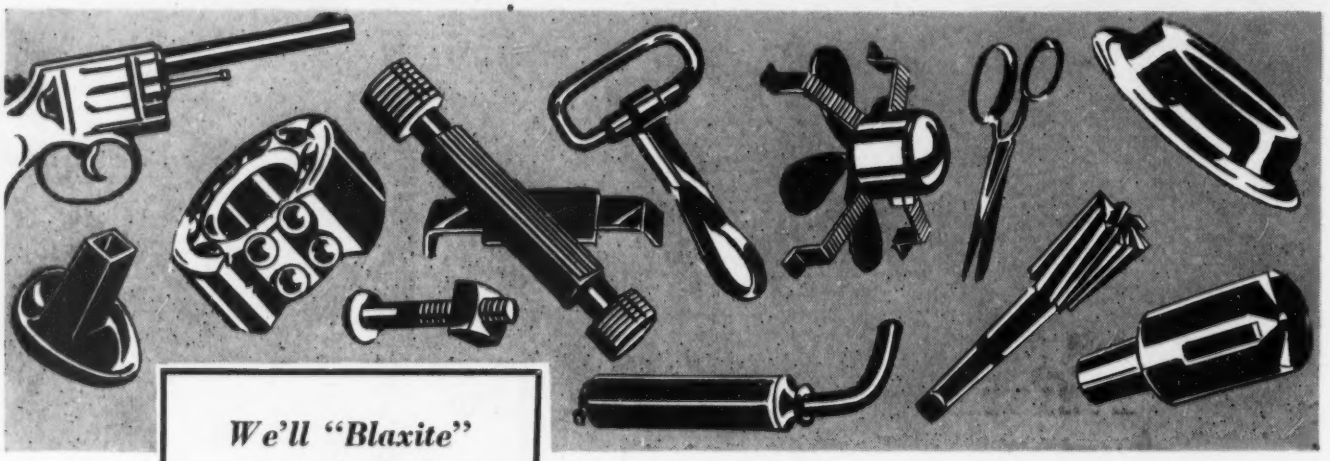
SPEED - *the big advantage of the low-cost Blaxite process*





We'll "Blaxite" Sample Parts Without Charge

See for yourself the superior finish given your iron or steel parts by the low-temperature Blaxite process. Longer resistance to rust, too.

The same perfect results can be guaranteed for production runs in your plant when you follow our specifications.

STEEL BLAXITE OXIDIZING

THERE isn't time these war days to experiment. Decide on "Blaxite" and speed up oxidation of iron or steel parts. Developed by experts of long experience in metal finishing. Blaxite gives a uniform, durable black in dull finish or high gloss, and does it economically and *quickly*. The rust-resisting surface will be free of all microscopic roughness, and will not chip, peal, crack or blister. Let our engineers submit designs, specifications and estimates for *speedy*, inexpensive oxidation of your parts.

Prompt Delivery

The TOBLER CHEMICAL *Company*

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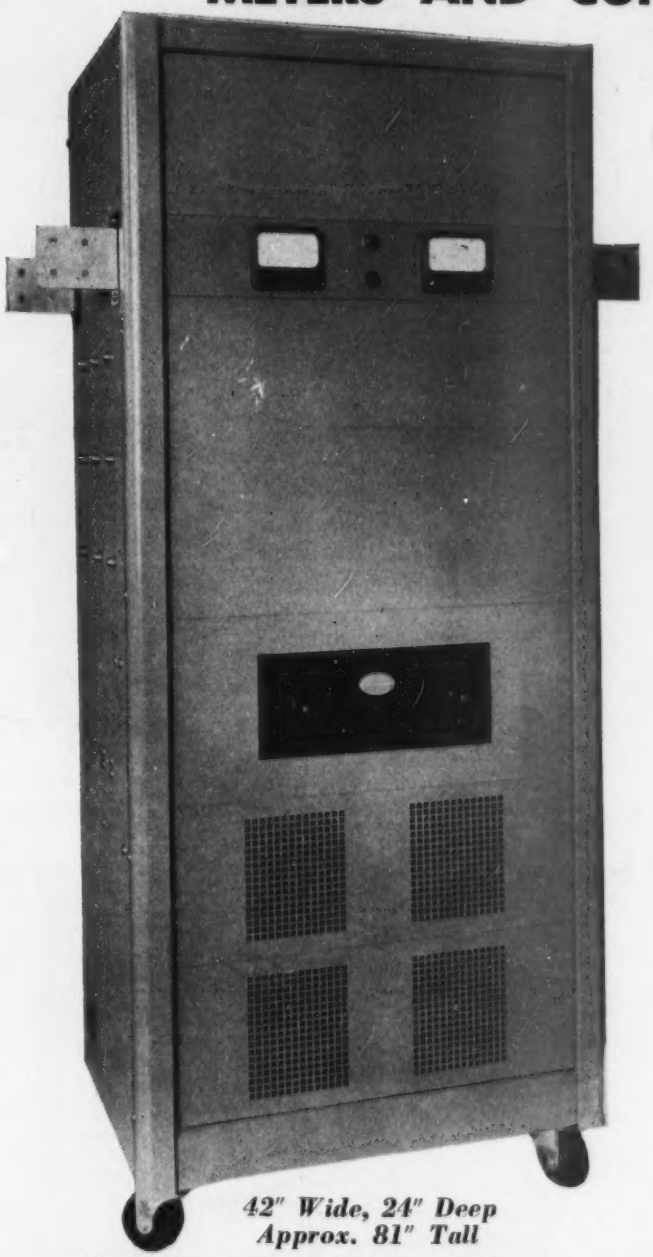
SELECTRO-PLATER

GREEN SELECTRO-PLATER

COMPLETE IN ONE CABINET WITH METERS AND CONTROLS BUILT IN



42" Wide, 24" Deep
Approx. 81" Tall
Capacity up to 4000 Amps at 6 Volts

STANDARD UNITS:

6 Volts – 25 - 50 - 75 - 100 - 500 1000 - 1500 - 2000 - 3000 - 4000 amperes

8 Volts – 300 - 600 - 900 - 1200 1500 - 1800 - 2400 - 3000 - 3600 amperes

12 Volts – 600 - 1200 - 1800 - 2400 amperes

16 Volts – 300 - 600 - 900 - 1200 1500 - 1800 amperes

24 Volts – 300 - 600 - 900 - 1200 amperes

48 Volts – 300 - 600 amperes

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Special requirements are met by engineering to individual needs.

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Write Dept. J for illustrated booklet

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Calling all Hands

FOR ON-THE-JOB SAFETY AGAINST SKIN IRRITATIONS

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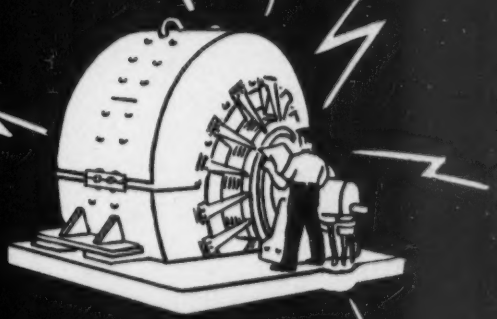

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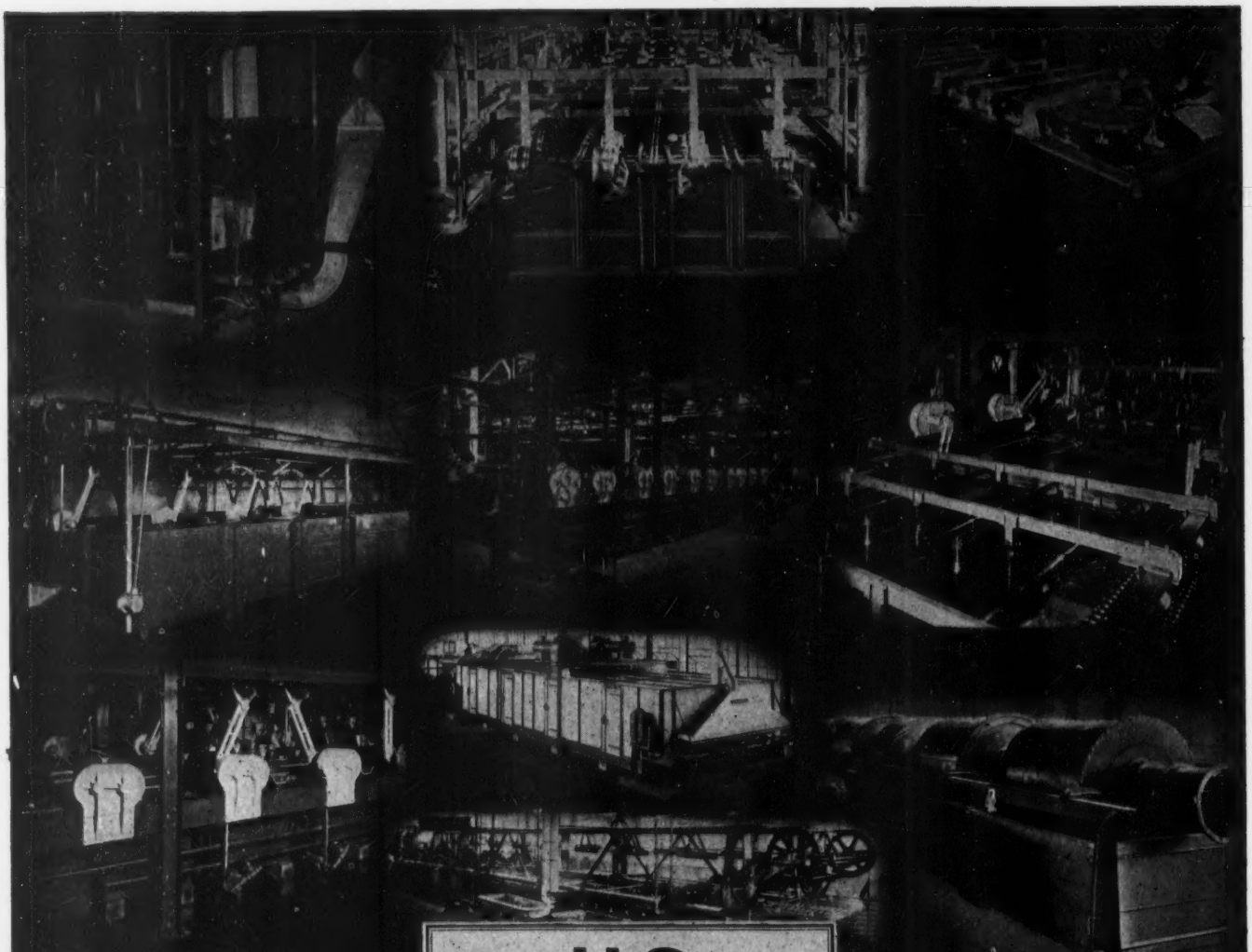

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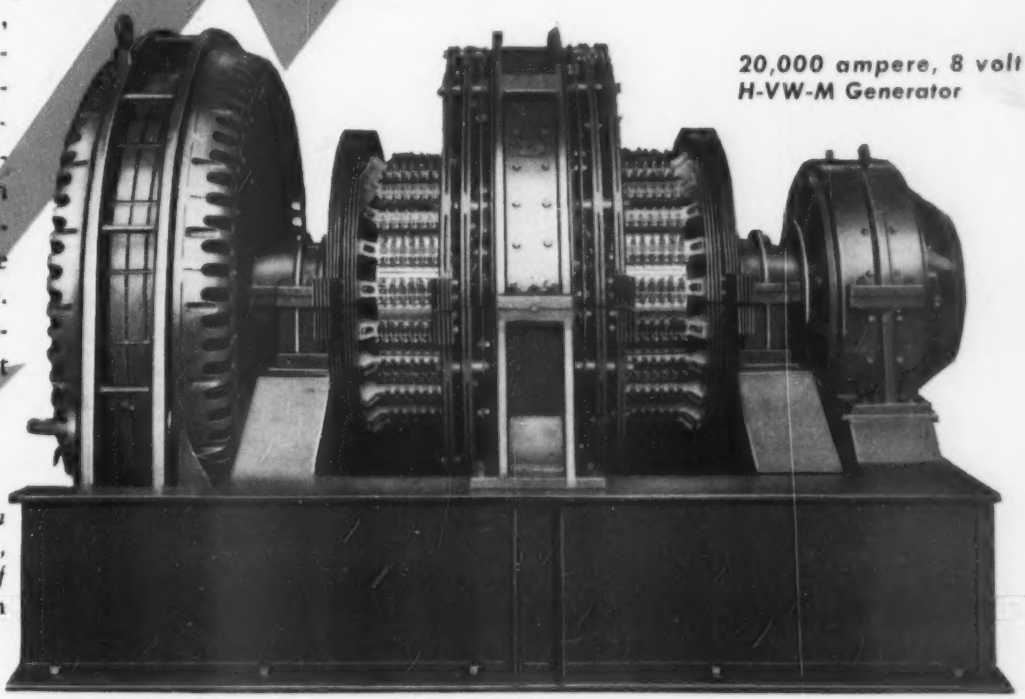

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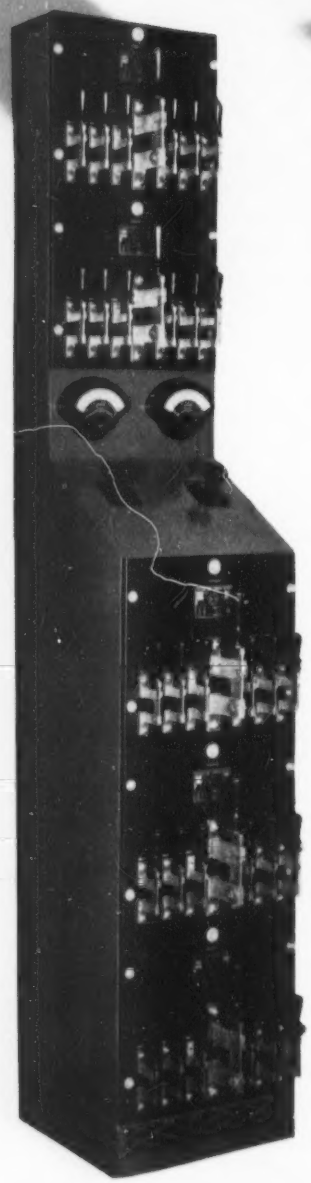

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VOL. 41, NO. 8 METAL FINISHING AUGUST, 1943
PREPARATION, ELECTROPLATING, COATING

OPERATING WITH WOMEN WORKERS

The shortage of manpower has necessitated the introduction of women workers into our industry, to an extent never before attempted in this country.

The problem presented has been particularly troublesome, especially to the large majority of companies who have lacked the broad background of experience required to successfully utilize this type of help. However, by familiarizing foremen and supervisors with the limitations of women plant workers and by making the psychological and physiological adjustments in working conditions which are necessary when women are substituted for men, it will be found that the distinction between "man's work" and "woman's work" will often disappear in the metal finishing department.

In certain kinds of work women are as good or better than men. In other kinds, such as heavy work in general, they fall far short. Since their digital dexterity is much superior and they thrive on routine, repetitive work, women make excellent rackers and wirers, especially of small, light articles. To utilize their capabilities with maximum efficiency, facilities must be designed to accommodate their physical characteristics, for example: lower racking and work benches and higher platforms at plating tanks to serve their shorter stature.

Some states limit the weight which may be lifted by women to 25 pounds; hence racks may require cutting down in order to carry fewer parts. The Woman's Bureau states that women should not lift 25 pounds more than 15 times per hour. In some states rest periods are required together with facilities for reclining if the employees should so desire.

Even if in a particular locality there should be no statutes covering such matters, management cannot assume that there is no necessity for introducing improvements. It must be remembered that the plant which makes its jobs attractive to women and which demonstrates its interest in the health and welfare of its employees usually gets the pick of the labor market.

Adapting Certain Type Vapor Degreasers for Cleaning Small Parts

By BARNET D. OSTROW

Chemical Engineer, Benrus Watch Co., Waterbury, Conn.

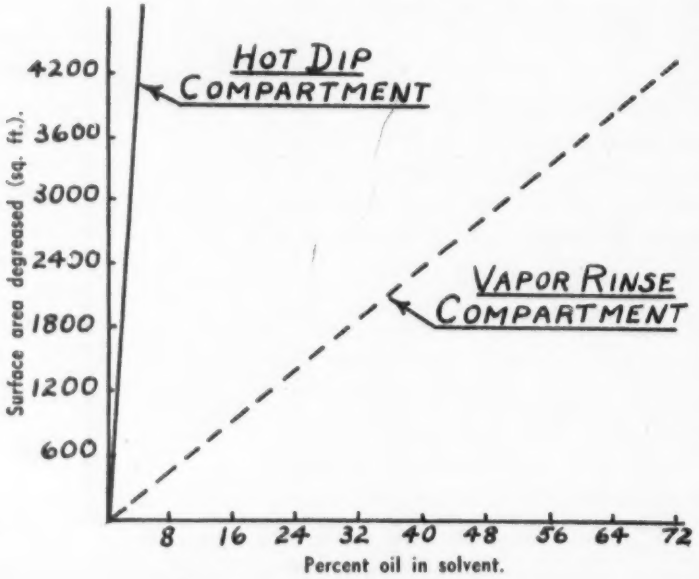
IN the plant engaged in the manufacture of small parts there are undoubtedly various phases in the process that require the removal of grease or oil. In many instances, the use of the conventional vapor degreaser is very desirable because of its ease and rapidity in cleaning. Under present conditions, many organizations have found it necessary to utilize equipment on hand for cleaning of metals previously not handled in the plant. Particular difficulty may be encountered in cleaning small parts which have good thermal conductivity (such as copper and aluminum) in degreasing units that have no intermediate cooling device. It was under such conditions that the writer was able to run actual production tests and evolve a procedure that would produce a satisfactory job.

For convenience in discussion, degreasing units will be classified here as:

1. One-dip or one compartment (quite common in small, electrically heated units using perchlorethylene as the solvent and air as the coolant).
2. Two-dip or two compartment.
3.(a) Three-dip, old type (these units have no intermediate cooling dip).

(b) Three-dip, newer type (having an intermediate cooling dip). Units classified under 2, 3(a), and 3(b) all use trichlorethylene with water as the coolant.

The usual vapor degreasing setup in the three-dip, newer type units has one boiling compartment full of solvent, a second compartment full of relatively cold solvent, and the third only partially filled (about 15 per cent) with boiling solvent (the remaining volume being naturally occupied by vapors). Hereafter, the compartment containing boiling solvent will be referred to as the hot dip, the one with the relatively cold solvent as the cold dip, and the partially filled one as the vapor rinse. In operation, the work is first immersed in the hot dip, then in the cold dip (to chill the parts), and finally in the vapor rinse where the relatively cool work causes the hot trichlorethylene vapors to condense on the parts. It is obvious that when both the hot- and cold-dip chambers have built up in oil only a vapor rinse will give a product free of oil or grease. If the nature of the work is such that the parts very quickly attain the temperature of the vapor (i.e., if the metal has a high thermal conductivity such as aluminum and copper and the pieces are of small cross section), then a sufficient volume of clean solvent vapors will not be condensed on the work, sufficient rinsing action will not occur, and the resulting product will be covered with a film of grease or oil. It can therefore be seen that the solvent in the vapor rinse chamber acts as a reservoir for clean vapors and that the condensing action, which performs a function similar to flushing, depends primarily on the temperature difference between the work and the vapors, and on the cross sectional area of the parts.



Oil build up in two dip degreaser.

The old type, three-dip machines as well as two-dip units have, as has previously been mentioned, no intermediate cooling dip or device. Naturally, when parts of small cross section and high thermal conductivity are immersed in the two hot dips of the old type, three-dip units or in the single hot-dip of the two-dip units, subsequent vapor rinsing has little or no favorable affect, since there is practically no temperature difference between the work and the vapors to enable sufficient solvent to condense and rinse these parts. Actual production tests conducted on degreasing of small aluminum parts showed that oil or grease-free surfaces were not obtained from the vapor rinse when the oil content of the last hot-dip compartment was over five per cent by volume.

The following discussion will be based on data and information accumulated by the writer on the degreasing of small aluminum parts in two-dip and old type three-dip units. However, since most of this information was obtained on a standard two-compartment unit, all data and discussion here will be based on this type unit. It should be noted that no reference is made to solvent stability, which is in itself of prime importance for successful operation with aluminum.

The parts that were to be degreased came coated wth a light mineral oil having an average specific gravity of 0.90 and an average Saybolt viscosity of 60-75 (at 100° F.). The work was transferred to suitable baskets and hung in the vapor compartment of a standard two-dip degreaser.

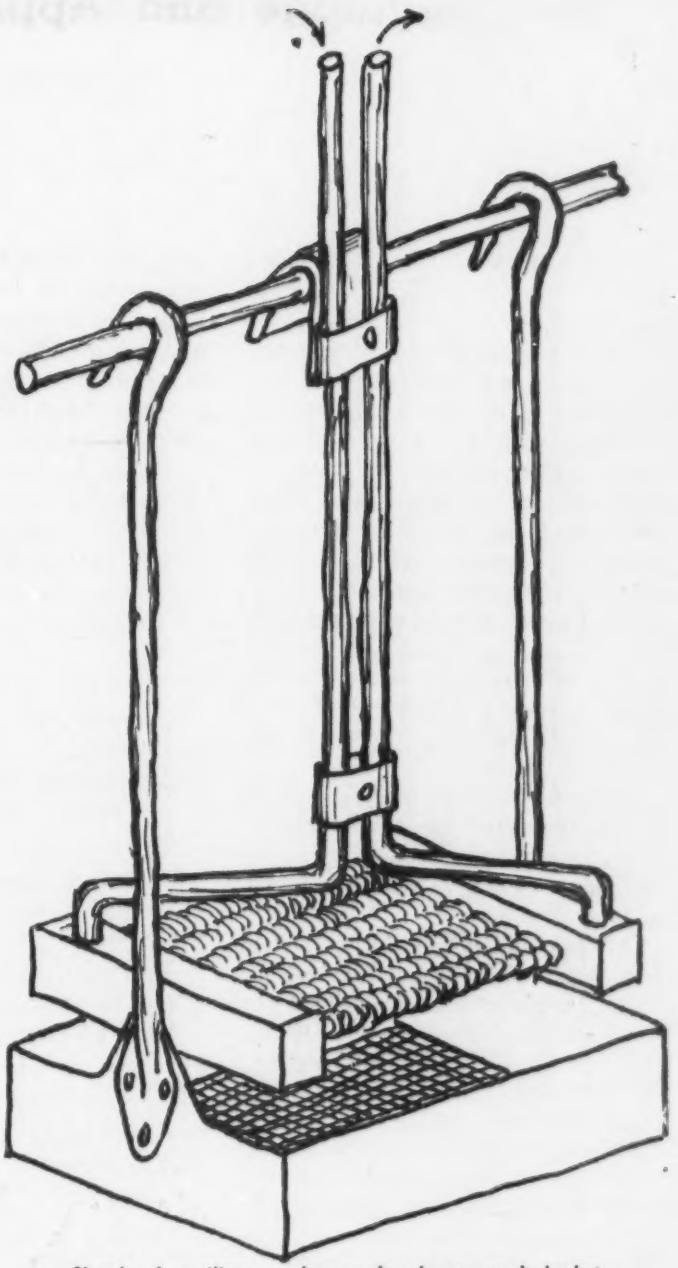
When condensation of solvent vapors no longer occurred, the parts were removed from the vapor rinse compartment and immersed in the hot dip. It will be noted that this is the reverse of the conventional procedure. Periodic checks of the oil content of the solvent in the hot-dip and vapor rinse compartments were made and a record of the total number of pieces which passed through the degreasing cycle kept. Since the average surface area per piece was known, the approximate total area degreased was thus available. These checks of oil build-up revealed that while the oil in the vapor rinse compartment rose from 0 to 60 per cent by volume, that of the hot dip seldom rose above three per cent and generally averaged about 1-1½ per cent. In order to depict this graphically, it has been assumed that the oil build-up of the solvent was proportional to the surface area degreased.

Since the volume of solvent in the hot dip was 50 gallons and that in the vapor rinse compartment ten gallons, the total volume of oil removed at the end of an average run by the hot dip was 1½ gallons and by the vapor rinse, six gallons—in other words, approximately four times as much oil was removed by the vapor side. Naturally as the oil content of the vapor rinse chamber is increased, it becomes necessary to raise the heat in-put because of elevation of the boiling point.

When the oil content of the vapor rinse side had reached the maximum desirable amount (in all tests this value was taken as 60 per cent), the solvent in this compartment was drawn off and saved for distillation. Sufficient trichlorethylene was then withdrawn from the hot-dip side to the vapor rinse side and the hot-dip compartment replenished with fresh solvent. In this manner, the oil content of the hot dip was reduced by additions of fresh solvent. During the course of these investigations, it also appeared that the oil in the hot-dip chamber began to increase quite rapidly when the vapor rinse approached approximately 40 per cent oil. The residue from the vapor rinse tank was accumulated until a sufficient quantity was obtained to warrant its distillation. Batch distillation and blending the distillate with an equal volume of fresh solvent is favored by the writer particularly when degreasing aluminum.

It was decided to carry these tests further and run the two-dip unit in the conventional manner (i.e. hot dip—vapor rinse) but to insert into the vapor rinse over the work basket an auxiliary condensing device which would cause rinsing of the work by clean condensate. A stationary condenser was not considered desirable, since it was believed that it would destroy the condensate balance in the machine. Preliminary tests have shown encouraging results and further investigation is being conducted along this line. A sketch of a proposed auxiliary condensing unit which has been hung over a work basket is shown in Figure 2.

In the sketch, the work basket and condenser are suspended from a supporting rod which is attached to the degreaser. The vertical tubes from the condenser are clamped in a device which enables the adjustment of the correct height of the unit above the work basket. These vertical tubes are welded or silver soldered into headers which carry finned tubing. This finned tubing offers a large condensing surface as well as a means of directing the flow of condensate onto the work. Rubber tubing may be used to connect the water supply to the unit, but this tubing should be kept away from the solvent vapors and the joints shel-



Sketch of auxiliary condenser placed over work basket.

lacked to insure a leak-proof connection. The auxiliary condenser may also be made stationary and the water circulated only when the work basket is beneath it. If it is desired to experiment with the above or similar type unit, a convenient and simple substitute is to use the radiator elements from an old automobile hot-water heater. A similar condenser to the one sketched may be used also in electrically heated single-compartment degreasers (which use perchlorethylene with air as the coolant). However, instead of water, air can be circulated through the condenser tubes by attaching the water inlet tube to an exhaust unit and by leaving the water outlet tube open to the atmosphere. This will constantly draw cool air through the tubes and cause clean solvent to be condensed on the work. In order not to cause any air convection currents above or near the degreaser, the air intake tube should be made so that its opening is at floor level.

Sincere appreciation is expressed to Mr. C. L. Ragot, Chief Tool Designer, Benrus Watch Co., for his sketch and helpful suggestions in the design of an auxiliary condenser.

The Language and Application of Colors to Metals

By EDWARD ENGEL

Chief Engineer, Technical Process Division, Colonial Alloys Co., Philadelphia, Pa.

ELECTROPLATERS seldom practice dyeing, painting and colored lacquering of metals. However, the increased production of aluminum and magnesium, and their entrance into the sphere of the plater, will require an appreciation and a knowledge of colors. The surface finishing of aluminum and of magnesium alloys will extend the fields of industrial plating departments and of contract platers. The greater number of the alloys of aluminum and of magnesium, and the greater variety of possible finishes on these alloys necessitate that platers acquire a knowledge of these alloys, their finishing processes and the art of coloring.

The variety of electroplating finishes on aluminum and magnesium alloys, as compared to the single electrolytic finishing process for other metals, can be noted as follows:

(1) The electrodepositing of metals on aluminum and magnesium.
(2) The electrodepositing of oxygen on aluminum and magnesium, by reverse current plating, called anodizing.
(3) The dyeing of the anodic oxide film, or the painting or colored lacquering thereof.
(4) Combinations of the above finishes.

In reference to coloring applications within the scope of electroplaters, it is well to bear in mind the possibility of commercial processes for the electrodepositing (Electrophoresis) of colored synthetic lacquers on metals and on "Metallized" materials.

The dyer, painter, printer and other industrial specialists will soon be joined by the plater in a common interest in colors and their selection, matching and design. The subject of colors is a broad one requiring appreciation and study, and much interesting experimentation. It is the object of this article to introduce the plater to the language of colors together with a few words concerning their application to aluminum and magnesium.

WAVE LENGTH: The visible spectrum is measured by millimicrons (billionths of a meter). The lower value as represented by the violet end is 400 millimicrons, and the upper end, red, is 700 millimicrons in dimensional wave length. Therefore, the visible spectrum wave length is much shorter than the wave length of radio signals.

COLOR LANGUAGE: The Achromatic Basic Colors are the blacks through the grays to white. The Chromatic Colors include all other colors. The Chromatics are considered in three groupings:

(1) Primary colors—red, green and blue.
(2) Secondary colors—orange, purple, yellow. The secondary colors are formed by using two of the primary colors.
(3) Tertiary Colors—olive, citron, etc. The tertiary may be made by combining particular colors of the secondary group.

QUALITY: Three qualities or attributes of colors are considered in the common language of color as follows:

A. *Hue Circuit*—The Hue Circuit is divided in ten principal divisions of which five are called "simple hues"—red, yellow, green, blue and purple. The other five are called intermediate hues between: (1) yellow and red, (2) blue and green, (3) green and yellow, (4) purple and blue, (5) red and purple. These ten divisions are arranged in a circuit graph and given letter symbols. (See Figure 1.) Thus, hue corresponds in a broad way to dimensional wave length.

B. *Value Scale*—In order to designate color value, absolute black is considered zero and absolute white as ten. The nine steps between are defined and this range of grays numbered as "value steps," one to nine.

Thus, value of a color refers to brightness.

C. *Chroma Steps*—The chroma steps for each color in relation to the amount of gray present in the color are arranged by taking the color in its strongest term as ten steps removed from the neutral gray, and then filling in the steps between.

Chroma, therefore, refers to the purity of a color.

Etc.—5—4—3—2—1— **GRAY POLE** —1—2—3—4—5—Etc.

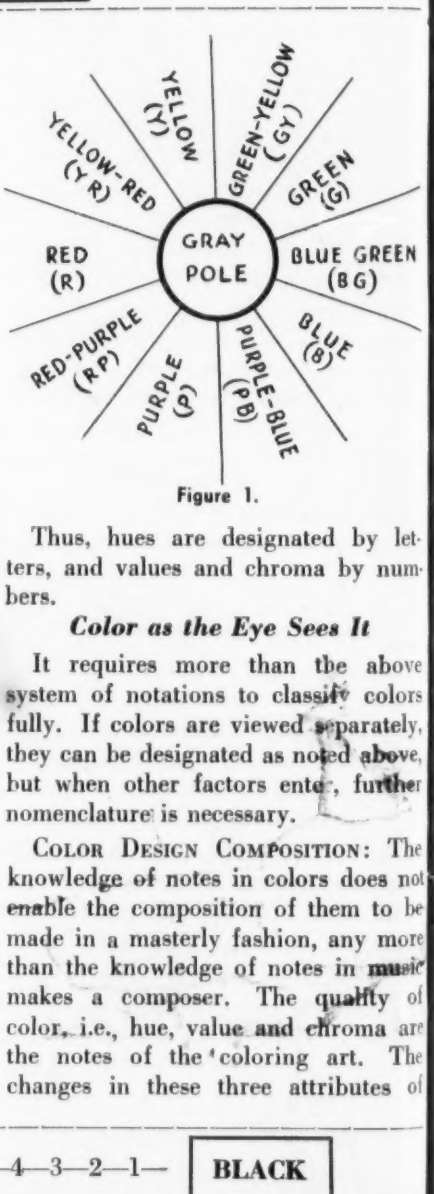


Figure 1.

Thus, hues are designated by letters, and values and chroma by numbers.

Color as the Eye Sees It

It requires more than the above system of notations to classify colors fully. If colors are viewed separately, they can be designated as noted above, but when other factors enter, further nomenclature is necessary.

COLOR DESIGN COMPOSITION: The knowledge of notes in colors does not enable the composition of them to be made in a masterly fashion, any more than the knowledge of notes in music makes a composer. The quality of color, i.e., hue, value and chroma are the notes of the coloring art. The changes in these three attributes of

WHITE —9—8—7—6—5—4—3—2—1— **BLACK**

color due to contrasts and other factors as noted below, are steps in the direction of the knowledge of composition in order to procure a symphonic arrangement of color.

The factors affecting colors in simultaneous contrast are described as:

(1) *Hue Changes*—The hue changes whenever the background or contrast is other than white. For example: Green on a blue background will partake of the complementary hue of its background as it will on yellow, appearing bluer in the first case and yellower in the second instance.

(2) *Value Changes*—Value is the classification of a color according to its lightness or darkness, that is, such as a scale of grays from white to black. For example: Gray appears lighter against black, and darker contrasted to a white background.

(3) *Chroma Changes*—Chroma quality of a color is designated as weak or strong chroma. A color is compared to another color as having a weaker or a stronger chroma as it contains more or less gray; i.e., the color with less gray has the stronger chroma. For example: Green undergoes a change in appearance, seeming stronger on a gray background and grayer (weaker) against a strong green background.

(4) *Combination Value And Chroma Changes*—Example: The same red appears both lighter and grayer on a dark red, and darker and stronger on white.

(5) *Hue, Value And Chroma Changes*—Example: The grays acquire chroma and hues complementary to their backgrounds. Thus, on dark red the hue of gray takes on a reddish tinge and on green it takes the greenish tint, and its value is lighter on the red than on the green and its chroma (gray appearance) is stronger on red (appearing less gray) than when on green.

(6) *Hue And Value Changes*—Example: Green seems to shift toward the complementary hue of its background, appearing bluer on blue and yellower on yellow, and lighter in value on a blue background.

(7) *Negative After Image*—Complementary colors may be seen by retinal fatigue. Looking at a strong red light in the dark and turning away will produce an image of green to the eye. Complementary colors are any two colors whose mixture produces on the eye the impression of white light; thus, red and bluish green and orange and light blue. When complementary colors are viewed next to each other, the effect is a mutual heightening of color impression.

(8) *Positive After Image*—Gazing at a Mazda lamp and turning the eyes toward a darkened area of the room will produce a yellow image.

(9) *Legibility Contrasts*—Strong colors are more legible when shown by contrasts; yellow on black will present far greater legibility than yellow on light blue. Maximum contrasts depend on dark backgrounds with strong color foregrounds, and this will also give greater three-dimensional effects.

(10) *Color Balance*—The use of equal areas of complementary colors must be used to obtain color balance; or the color with the stronger quality must occupy less area in proportion to its greater strength.

(11) *Selective Absorption*—Selective absorption of colors is exemplified by the metallic reflection caused by certain pigments, such as those absorbing green rays and when over dark backgrounds, a metallic or bronze effect is created.

(12) *Light Effects*—The type of lighting under which a color is viewed or contrasted is very important. For instance, a purple of a pure nature under sunlight, will appear red purple under a Mazda lamp and blue under the North skylight. Colors which match under sunlight may be poor matches under artificial light.

(13) *Surface Effects on Color*—If the boundary surface is smooth, the light reflects in such a manner as to cause the dye to appear glossy. And the same dye applied to a rough surface will create a dull, matt appearance.

(14) *Depth or Thickness of Color Film*—The depth of penetration of a dye or stain will govern to some extent the results obtained. To a lesser extent, the thickness of a paint pigment will affect the appearance and quality of the color. Each of the contrasting effects as noted are capable of throwing the original selection of a color out of value, hue, chroma, and balance.

The Mechanics of Color Selection

The foregoing present the basic physical and contrast factors governing color selection. The methods or mechanics of using these factors require some consideration in order to arrive at the desired results.

Mixing colors in order to obtain a desired color is the *Subtractive Method* of color selection.

The *Additive Method* consists of placing uniform dots or squares (like a miniature checker board design) of the colors in an alternate manner on a paper or on the material to be colored. Viewing this design at a distance will present the color which will result from the proportionate mixture. Thus, a checker board with small squares of green and yellow will present a gray color when viewed at a distance.

PROCEDURE IN COLOR SELECTION—It is a physiological fact that sensation lasts longer than the impression producing it. This is to say, as an extreme example, the momentary touching of a hot object will continue to leave its effects for a considerable length of time.

In viewing colors in order to compare their attributes and their contrasts, an incorrect procedure obviously is more certain to give erroneous results than the proper approach. If two or more hues are contrasted for their value and chroma, or two or more values and/or chroma strengths of one hue are contrasted, they should not be viewed separately, as the impression gathered from one will be held over when viewing the other, i.e., for instance, it may involve negative after images. Even a momentary shadow at the time one color is being scanned will destroy the correctness of the contrasts. The correct procedure in making color contrasts is to view the colors being compared simultaneously. View one with the left eye at the same time the other color or contrast is viewed with the right eye, and check by reversing the scanning operation.

In comparing plated finishes and other surfaces, in order to contrast smoothness, hardness, tackiness, temperature and other factors, a simultaneous — two hand — examination should be made, in a similar manner as when making eye scanning contrasts.

REFRACTIVE INDEX: The relation of velocity of light in air to its velocity in another material is called its Refractive Index, for example:

Vacuum	1.000
Air	1.003
Water	1.333
Alcohol	1.361
Linseed Oil	1.49
Glass	1.5
Diamond	2.47

The transparent colors and pigments have low refractive indices, and opaque ones high indices.

THE HIDING POWER OF A PIGMENT: A pigment whose reflective index is more equal to that of the vehicle which contains it, will have low hiding power. And a pigment with high hiding power will be found to have a higher index than its vehicle. The indices for white pigments are:

Aluminum hydroxide	1.48
Barium sulfate	1.64
Lead sulfate	1.93
Zinc oxide	2.02
Zinc sulfide	2.37
Titanium oxide	2.76

It will be noted that titanium oxide has a much greater reflective index than linseed oil, its vehicle, and its hiding power, therefore, is the greatest of these pigments.

COVERING POWER OF A PIGMENT: The covering power of a paint pigment is dependent on the fineness of the mesh, the type of vehicle and the nature of the pigment.

ELEMENTS OF PAINTS AFFECTING COLORS: The vehicle, usually a drying oil such as linseed oil or China wood oil, also governs the color effect. A transparent blue pigment, for instance, will attain a green hue from the yellow of the oil vehicle.

Dyeing

Since over 2,000 dyes are on the market, dyers have recourse to much accumulated knowledge from many sources. In the dyeing of aluminum oxide films and magnesium oxide films, however, some different experience is required than that used in the textile and other fields.

The selection of the dyes and the balancing of the dye baths require consultation with both the dye manufacturer and the anodizing process licensor.

In general, only the water soluble dyes, the basic dyes, are used for dyeing aluminum and magnesium alloys. These dyes are fairly resistant to water, but they are not sunfast. However, there has been developed a method of increasing the resistance to sunlight of a wide range of dyes.

The colors of metals are generally considered neutral, though aluminum and to a lesser extent, silver, may be thought of as bluish in hue. The oxides of aluminum vary from dull whitish to grayish, depending on their alloying. The oxides of magnesium are light to dark gray.

FACTORS AFFECTING THE DYEING OF METALS:

1—The boundary color of these alloys has an effect on the results obtained.

2—The depth of the oxide film also governs dye effects and this presents a means for obtaining wide variations. The timing in the anodic bath and the current density of the operation are governing factors for film thickness.

3—The size of the pores of the oxide film is of equal importance as the other physical factors of the film in the effect on results. The temperature control of the anodizing bath has a considerable effect on the pore size of the oxide film, as does the current density and voltage. The voltage governs the hardness of the film; higher voltages present harder films.

4—The maintenance of the chemical composition and pH of the anodizing bath is a requirement in obtaining consistent results. As the aluminum sulfate content of the "simple" sulfuric acid bath increases, the current efficiency decreases, and etching is accelerated and the presence of the aluminum sulfate in the pores generates subsequent dyeing inconsistencies.

The aluminum sulfate content of the simple sulfuric acid bath is not easily precipitated out; hence, the efficiency gradually decreases necessitating the frequent discarding of the electrolyte. The addition of certain proprietary salts to the sulfuric acid of low acid-concentration anodizing solution, provides an electrolyte which precipitates the aluminum sulfate and renders it easily removable. The permissible current density and voltage are higher in the electrolyte containing the modifying salts, thus permitting faster operations. The operating temperature may be much higher in the electrolyte containing the modifying salts; thus, the operation is less delicate and results in fewer rejects.

MAGNESIUM ANODIZING: Certain electrolytes used in anodizing magnesium create an oxide film which is easily dyed and also withstands corrosion at least equal to the PT 13 Navy Specification electrolyte. The latter produces an oxide film not suitable for good dyeing effects. The dye baths are of such a nature that pH and temperature control and sealing methods require the licensor's assistance.

Comparative Merits of Metals for Dyeing, Lacquering and Painting

Steel cannot be dyed except for very temporary effects and within a very limited range of controlled coloring. These limitations are true in attempts to dye copper and its alloys, or the zinc and lead metals. Aluminum and magnesium alloys are exceptional as dye bases, due to the suitability of the oxide film produced electrolytically. This film is next to diamond in hardness and over twice as hard as a triple coat of baked enamel. The films are abrasion-resisting and fairly flexible.

The dye entering the oxide pores becomes integral with the oxide film, due to the capillary attraction of the minute pores and the mordant action of the aluminum hydroxide present in the aluminum film. The same occurs in magnesium using certain processes for producing a magnesium oxide film on magnesium alloy. The same merit of absorption inherent in the oxide film which renders its dyeing easy and permanent, presents the film as the ideal metal for lacquering and painting.

The average anodizing operation presents a film of about 0.0004″ thick of which about 0.00015″ is added dimensional thickness. Varnish increases the dimensional thickness about 0.001″ and painting increases the thickness to about 0.003″. It is to be noted that varnish, lacquer and paint key themselves into the pores and are not merely surface bonded as occurs on other metals.

A zinc chromate primer on aluminum, besides its value as a mechanically protective coat, also serves electrolytically to protect aluminum oxides should the painted surface be scratched to expose the metal base. All in all, aluminum may become the Number One metal to the plating industry. And magnesium must be included in the metals which the plater will process in increasing quantities.

On Finding a New Foreman for the Metal Finishing Department

By FRANK V. FAULHABER

Brooklyn, N. Y.

CONSIDERABLE of the metal finishing department's success depends upon the foreman. Secure the most capable employees you will, in the final analysis the foreman is responsible for the quality and quantity of the output. It is necessary, of course, that full, enthusiastic cooperation be accorded by other department heads; otherwise the work is bound to suffer somewhere along the line. Nevertheless, once an efficient finishing foreman is procured, everything within reason should be done to encourage him to stay and to grow with the plant. However, for various reasons, from time to time, new foremen must be found and the plant is faced with a real problem.

A Fixture from Another Plant?

Where to turn? Just who should be assigned the responsibility? Those at the head of the plant reason that a good man is worth a good price. There is much meditating and pondering. Much worrying too, sometimes. Finally, it is decided to turn to another plant, where the metal finishing foreman is known to be a man of real ability and experience. It is borne in mind that this particular foreman has served his employer over a long period, which is a good recommendation in itself.

As a matter of fact, it may come to light that the foreman under consideration has held sway in his particular department even longer than first hazarded; sometimes for years on end. The proposition becomes even more attractive. However, there seems to be a fly in the ointment. You can't really blame the man for disliking the thought of transferring his services after having worked in one place so long. But, the tempting enticement of a larger salary is not held out every day. Finally, the decision is made; shortly this foreman will assume responsibility in the new plant. Sometimes certain definite understandings are required before the change will be undertaken; sometimes a successful foreman insists on a contract, and who can blame him?

Well, we find the new metal finishing foreman in charge. He has proved a success in every possible way in the other plant, so why not here? However, we find it not always so. In the first place, here you have a man who has worked for perhaps 25 years in one plant. He knows virtually everything as far as that plant is concerned—he is acquainted with its own individual problems. The new plant has problems individual to itself also.

It must not be overlooked that the foreman who has gained his experience in one or two plants has rather set, confirmed ideas. It is tantamount to a rigid prejudice from which he cannot easily be swerved, even upon assuming a new charge. Such an individual is often so adamantly insistent on his own convictions and ideas and so unreceptive to those of others that he veritably discourages any assistance which might be offered. He puts a damper on others' cooperation and incurs their ill-will; in a word, things fail to function smoothly, amicably, successfully, and expectations are not as anticipated.

He feels that he knows best what is needed, for has he not successfully and profitably operated in another plant? However, it is not so much a question of what he has done, in that other plant; rather it is a question of what he can do in this one. That is of paramount importance.

There are certain specific problems to be met and mastered in new surroundings. Oftentimes, these problems are as new and as unfamiliar as is the strange environment in which the new foreman finds himself. To a large extent, he finds his problems difficult with much experimenting necessary. Frequently this experimentation, too, is costly. All these constitute problems which his new employers had scarcely visioned.

Suddenly, we find that this highly-touted foreman, who comes with gaudy feather in cap, is not the prize package he was originally evaluated to be. What to do now? This new finishing foreman certainly has not the wide experience desirable for his new position. He finds himself much at sea. He was a sort of fixture in the other place and was persuaded away for a higher salary. Can he be dismissed, summarily? Very annoying and puzzling problem, that! His superiors oftentimes find themselves required to worry along, as best they can, harboring a new foreman who was successful in another plant, but who turns out to be glaringly unsuccessful in theirs. They get very little value for the outlay entailed according to their estimations.

A Man with Varied Experience

So much for your old-timer. Let him stay in the other plant, undisturbed, where he is now a success! Rather, let us consider the possibilities presented by those foremen who have acquired their finishing experience in different plants. Such men do not come with the hide-bound preju-

dice usually inherent in the one-shop foreman who has worked for one plant practically all his life. The metal finishing foremen who have served in various plants possess more varied experience. Further, such individuals ordinarily do not require an excessively tempting increase when a new appointment is in order. They are more open to ideas, suggestions and well-meant assistance, too. That, also, should be borne in mind. We find, with relief, that it is not such a formidable problem to engage this type of metal finishing foreman either.

Another point in his favor is that the foreman who has operated in different plants has witnessed the performance of work under various conditions; he has observed how individual problems were met and mastered in different shops. He has worked with a greater variety of machinery, has done a greater variety of finishing work, is familiar with more finishing formulas and realizes and appreciates the necessity for good judgment in experimentation. Such a foreman has not been confined in one or two metal finishing departments; his operations have been distributed, so to speak. He knows well that every shop has its individual requirements. So many times the experienced, albeit well-meaning, old-timer insists on saddling his pet ideas onto the department of which he has just been placed in charge, however out-of-place those ideas may be. Because the foreman with more varied experience is more welcome to suggestions, he is also more certain to solicit ideas and opinions from others and for that reason, more sure to receive the help and cooperation which, none will gainsay, is needed in any efficiently-operating metal finishing shop.

On the whole, too, you will find that usually the other employees would much rather work with a foreman who welcomes their ideas and suggestions than with the old-timer who may ruthlessly wave them aside.

Promotion in the Plant

Yet, why turn to outside sources for foremanship material? Must possibilities within the plant be ignored . . . underestimated? How many times is some worthy employee, who has loyally served the plant, slighted, overlooked altogether, albeit he be a man of long experience, able, willing and glad to undertake the foremanship? It is true that such a man is not a full-blown foreman; however, he can be developed into such, and right within your plant itself, under your own supervision, and according to your own plans and hopes. Many times such an employee can be assigned the foremanship, conditionally. In time he must show results and his salary can be governed accordingly. You will find, too, that there are not the problems to be faced in engaging one of your own employees for the job as besets the appointment of an outsider, so many times unknown as to inherent ability, at least insofar as your own plant is concerned.

High in favor of the employee assigned as foreman is the fact that he possesses certain valuable knowledge relating to conditions and operations right within your own metal finishing department. This employee knows the men who will be working under him; he understands them; knows their foibles, failings, abilities; knows something about them that your rank outsider could not possibly know when he assumes charge.

The employee selected from your own forces also knows the machinery, materials and products which must come within the handling and responsibility of any new foreman who takes charge. He is familiar with respect to the various operations and specific finishing formulas that come to the fore in the daily routine of your own finishing department. This is all knowledge that such an employee already possesses; it is equipment he has that an outsider could not have to the same extent.

The writer is not blind to the fact that many executives are prejudiced against selecting someone from their own employee forces as a possible foreman because it is feared that undue familiarity may be exercised by the other employees with the new foreman, their previous co-employee. However, weigh the facts. No employee worthy of the promotion to such a new responsibility is going to fall down on the job because of that particular question. Consider whether your employees would rather work for a foreman chosen from their own ranks or for some stranger, whatever the latter's qualifications. Would they not much rather work with a foreman whom they know and understand and with whom they can get along, than with an outsider whose shortcomings they must learn, who may be aloof, and who knows not a whit about the different people under his wing with regard to their individual qualifications, traits and personalities.

Chosen from the ranks, the new foreman of the metal finishing department realizes he must show new results; he has a new incentive to urge him on. His superiors can cooperate with him more readily than is usually the case with an outsider. He can develop as he goes along, right within your own plant. So many times, an ambitious, deserving employee with eyes on the foremanship, is scarcely considered for promotion, however qualified he may be. Thus, turning to outside sources for foremanship material too frequently results in dissension in the ranks. There is grievance and ill-will and, as a result, one often sees a disappointed, able, efficient metal finisher leave for other fields where the prospects are brighter.

Reams might be written with regard to the precise merits of the deserving employee when a new foremanship is in order. Just remember that a man from your own ranks knows plenty about everything regarding your own department and that he will obtain the cooperation that an outsider frequently finds it exceedingly difficult to gain. If at all possible, let one of your own employees grow into a foreman, before taking chances on outsiders.

Cooling Barrel Plating Units

By R. B. EYRE

Chemist, American Sanitary Mfg. Co., Abingdon, Ill.

THE elimination of heat generated in barrel plating units becomes a definite problem today, especially in zinc plating.

With proper operation, it is relatively simple to obtain a current of 600 amperes at 12 volts on a barrel 14" x 30". To calculate the amount of heat developed in such an operation, the following method is used:

Amperes x Volts = Watts

$$\frac{\text{Watts}}{746} = \text{Horse Power}$$

.707 x H.P. = B.T.U. Per Second

or:

600 x 12 = 7200

$$\frac{7200}{746} = 9.66$$

.707 x 9.66 = 6.83 B.T.U. Per Second

To put this figure into terms familiar to all of us, we apply the following method:

6.83 x 60 Sec. x 60 Min. x 24 Hr. = 590,000 B.T.U. Per 24 Hours

$$\frac{590{,}000 \text{ B.T.U.}}{288{,}000 \text{ B.T.U. Per Ton of Ice}} = 2 \text{ Tons of Ice}$$

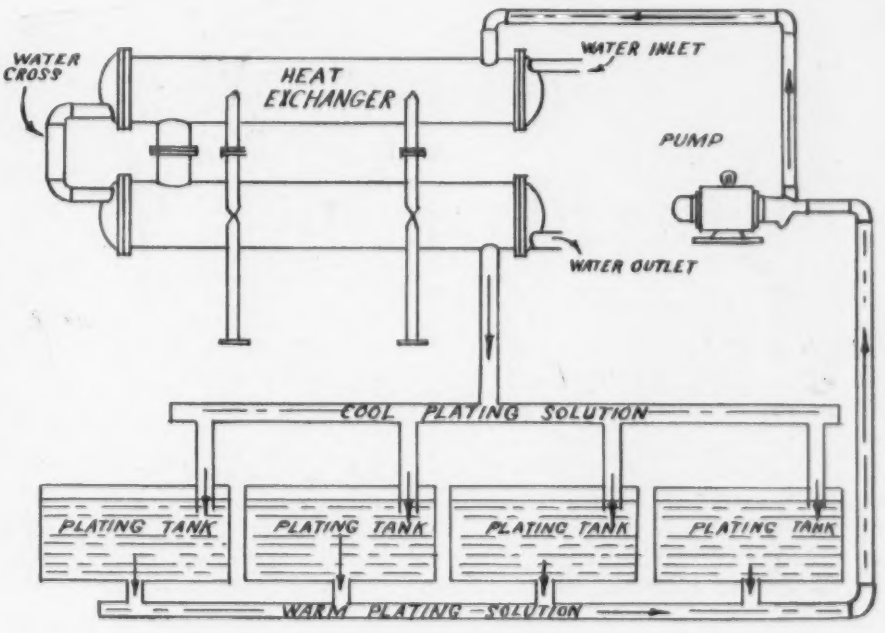
In other words, one zinc plating barrel operated at 600 amperes and 12 volts, will develop an amount of heat in 24 hours of operation which would take two tons of ice to cool. With this amount of cooling to be done, it is easy to see that the cooling coils ordinarily installed in a plating barrel unit would have difficulty in removing the heat evolved.

There are factors which affect the amount of heat to be removed other than by mechanical means. Radiation, conduction and evaporation all have a hand in removing heat. However, in the summer time, there cannot be much assistance from these factors and to be safe, it is wise to provide a method of removing all the heat developed by mechanical means.

In our own case, we considered three methods before deciding upon one. These were: mechanical refrigeration, evaporative condenser or cooling tower, and heat exchanger with city water. We examined each method from the viewpoint of availability of materials, capital outlay, operative cost, and simplicity of installation and operation.

Mechanical Refrigeration

This type of equipment calls for the largest capital expenditure. Its availability was within reason, but delivery dates were somewhat uncertain. The operating cost for electric current and water for the condenser was rather high. We felt that unless extra low temperatures had to be maintained, the job did not warrant this equipment.



Water cooled system.

Evaporative Cooling

Evaporative cooling, either with the use of a cooling tower or a compact "evaporative condenser", answered all questions from the standpoint of cost, availability and simplicity. However, a new element was brought into light—the question of humidity. Evaporation does a great job of cooling, providing the wet bulb reading does not go much above 75. From this point on, the efficiency drops quite noticeably. As our own locality is rather high in humidity during the summer months, we decided against this type of equipment.

Heat Exchanger with City Water

This is the equipment we decided to install. Our problem is to cool eight barrels operating in zinc at 600 amperes and 12 volts. This calls for the elimination of 196,000 B.T.U. per hour.

The system operates as follows:

The various plating tanks are leveled in respect to each other so that all solution levels are in the same plane. Pipe outlets are made near the bottom of each tank and collected into a common pipeline which runs to the pump. In selecting a pump, it is important to specify one which will deliver the required gallons per minute against the high head developed by friction loss and lift. A rough layout of the system should be drafted and distances, heights, and turns estimated. For each foot of level running 1¼" pipe, a friction loss of 0.6 foot should be considered. For each 90° elbow, 1.8 feet are added and for each foot lift above the center of the pump, another foot is added (the distance the pump is below the solution level may be subtracted). In our system, we estimated a 60-foot head and specified a pump to deliver 50 gallons per minute against this head.

The solution is pumped through the shell of one heat exchanger and around the nineteen 1¼" pipes, then into the second exchanger and back to the plating tanks. The water tubes are connected directly to a city water line capable of delivering 30 gallons of water per minute. This water makes nine passes back and forth in each exchanger and then is used in the rinse tanks throughout the plating room.

This exchange system consists of two shell and tube units, each 10" in diameter and 12' long. It is not necessary to use two units, but the manufacturer's delivery on two small units was much better than on one larger one.

With this equipment, the water moves through with a velocity of about 190 ft. per minute, and the solution at about 11 ft. per minute. In an hour's time, 250,000 B.T.U.'s will be removed, which is 25% over the 196,000 B.T.U.'s we expect to produce. This safety factor was added because allowance should be made for scaling or liming of the tubes which will cut down the efficiency as it increases.

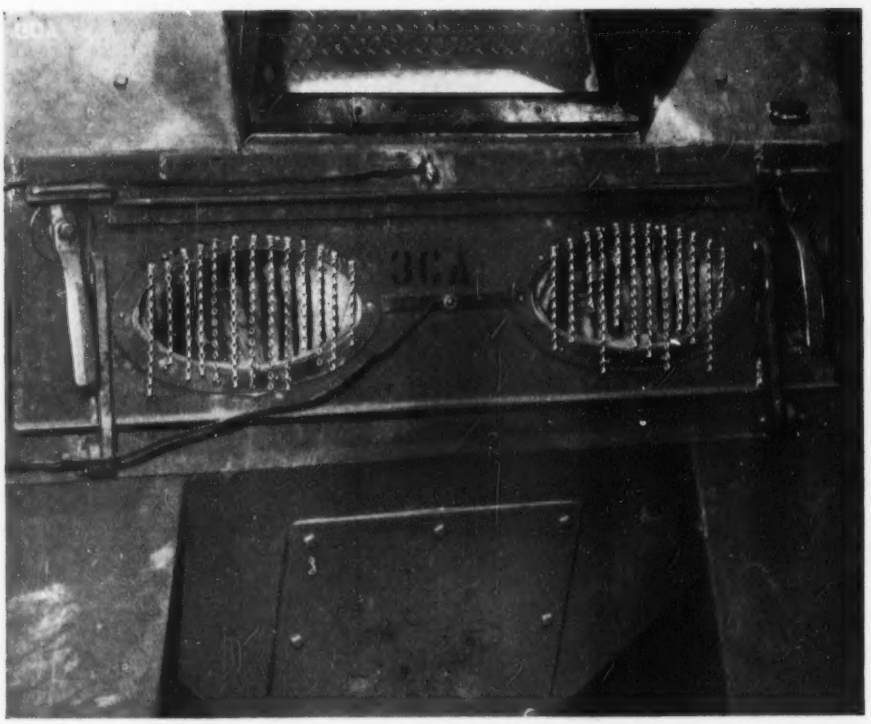
While we made no attempt to calculate the amount of heat that will be removed by evaporation, conduction and radiation, we feel sure that a definite aid will be realized, so this gives us an additional safety factor.

The temperature at which a bright zinc solution will best operate, is generally considered to be between 75 and 90°F. However, it has been our experience that, for the type of work we are doing, temperatures up to 100°F., will give us satisfactory results with reasonably good throwing power and brightness. We therefore set 100°F. as a maximum temperature. By delivering the cooling water to the heat exchanger not higher than 70°F., we will be able to keep our plating solution below 100°F. Theoretically, the water will enter at 70°F., and be discharged into rinse tanks at 83°F., while the plating solution will enter at 100°F. and be returned at 93°F. Actually, we expect the solution to remain somewhat lower than this because of our above-mentioned safety factors plus the fact that the barrels will be out of operation while loading and unloading is done.

At the time of writing, this equipment is in the process of installation, so we are giving only theoretical figures. However, several systems of a similar nature are now in operation in other plating plants and have proved to be satisfactory.

Several nationally known refrigerator manufacturers were consulted in the engineering of our equipment and we should be glad to furnish their names upon request.

CHAINS ELIMINATE STATIC ELECTRICITY



By hanging a number of brass chains over the arm ports of a carborundum blasting booth, discharge of static electricity between the operator's arms and the blasting enclosure is eliminated. This simple remedy was devised at General Electric's Schenectady works.

The Antiquity of Tools

By JOSEPH DANFORTH LITTLE

Bloomfield, N. J.

PART I

HOW many of us realize that many of the tools in our own tool chests are as old in principle as human history, indeed many of them antedate record of any kind. Comparatively few people are sufficiently interested to look into the beginnings of things. The average person of today using tools and appliances is content to take them as he finds them and accept their utility and their various names without a question. However, there are some sufficiently interested in the craft of tool makers to investigate the origin of numerous articles found in their tool chest or kit and trace the prototypes from which present day tools have evolved. Whether we accept the laws of evolution in reference to mankind or not, all must admit that many things have evolved from very small beginnings.

Unfortunately, all through history there has been too little record of workmen and their tools. In our own museums one may see large collections of silver and gold objects, weapons and armor, but few of the tools which man has used in making these, are shown. Many of our most modern tools trace their origin back to Archimedes, the Greek mathematician, to obscure Roman mechanics, or to the artisans of ancient Egypt. The paintings and sculptures of ancient Egypt, Herculaneum and Pompeii place before us very clearly the tools in use as far back as pictorial history can carry us. Stone tools have been found in the earth which antedate the time we are considering, but no works done by these tools have reached our time, unless implements such as arrows, hooks, needles and the like be regarded as works. The subject of the antiquity of tools is an immense one and in considering the tools used by early man, we can not help wondering what his culture was. How did he kill his game and get his fish and with what tools did he scrape his hides?

Tools from the Stars

The question arises as to how prehistoric tools originated and developed. In early days, some of the tools used by man were made from falling stars or meteorites. This was man's earliest iron, for most meteorites are composed of 95% or more of iron, tempered to the consistency of steel. At a very early date he learned to make tools from these, for he found that tools made from meteors were harder than any stone that he could find in or under the earth. In the Museum of the American Indian, in New York City, are specimens of meteoric iron tools which were made literally from material from the stars.

The earliest age of which we have any knowledge is the Stone Age, when tools, implements, weapons, and ornaments were fashioned exclusively of stone, horn or bone. The use of

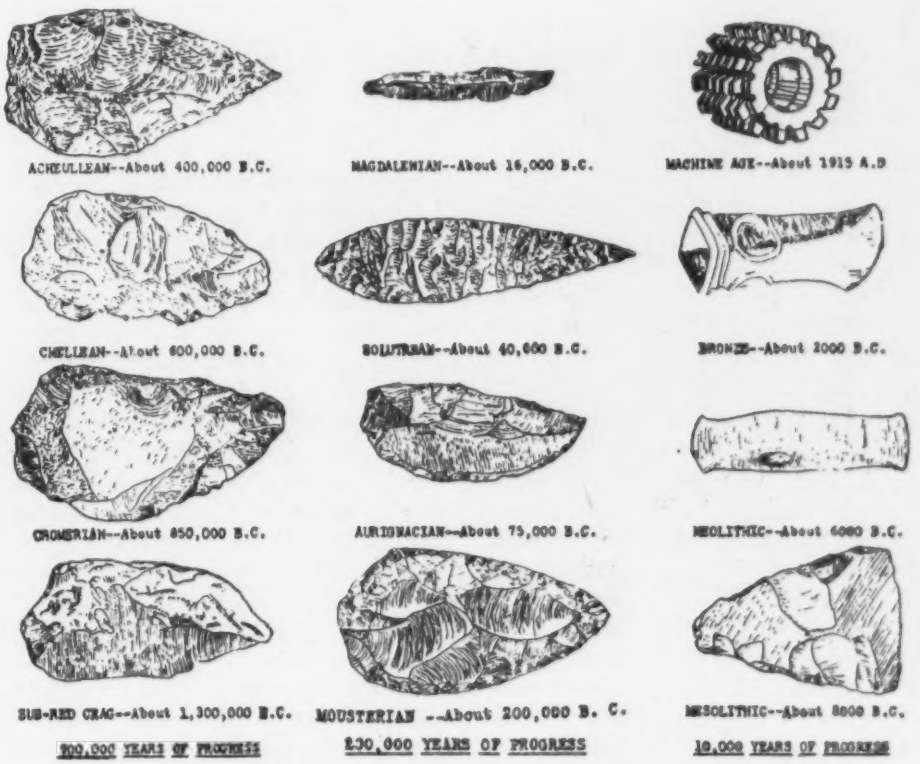


Fig. 1. One and one third million years of evolution in cutting blades.

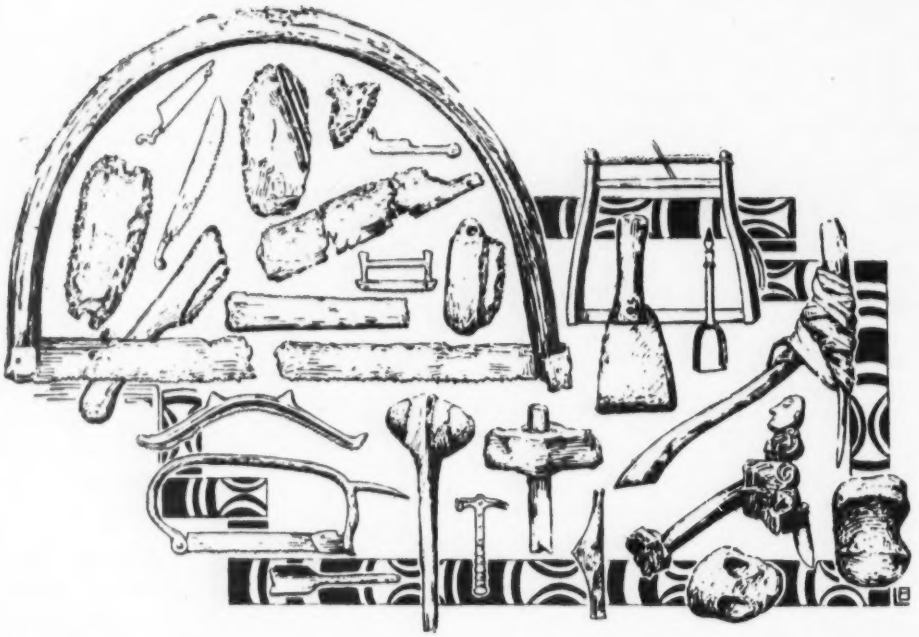


Fig. 2. (Upper left) Old Egyptian bentwood frame saw with ancient saws of different origin, mostly of flint. (Upper right) Old Dutch mason's saw for stone, of sixteenth century. Two bronze shovels from Egypt and Pompeii. (Below) Swedish and Roman saws (Bronze Age); Pima Indian shovel of mesquite; Comanche, French, Swiss, two Swedish and early American hammers. (Right) Above is a bronze adz with sycamore handle from Egypt, below a Maori stone adz from New Zealand.

metals for such purposes was then unknown.

There is no record telling us just when early man first discovered how to make tools of metal. The Age of Bronze succeeded the Age of Stone and at that time cutting instruments, such as swords, knives and axes began to be made of copper and of bronze. When in the course of time, iron replaced bronze for cutting instruments, the Bronze Age came to an end and the Iron Age supervened. It is quite probable the Stone, Bronze and Iron Ages may have been contemporaneous in different parts of the same country. The close of the Stone Age was not marked by the total abandonment of stone for bronze artifacts, as stone continued to be used for some kinds of implements well into the Bronze Age and even down to historic times.

It has taken thousands of years to make tools what they are today. Tools have been invented and improved down through all the life of man. Long before history began to be recorded, men worked in wood, metals and stone. All modern tools we use have evolved through the ages from sticks and stones and bits of broken bones, to the tools of finely tempered steel which we see in use today. On the Island of Crete, in a city that was old before the beginning of Athens or the founding of Rome, there was found a complete set of carpenter's tools which had been left there over four thousand years ago, when the city was burned by an invading enemy. There were carpenters in ancient Troy also and in Rome and in ancient Egypt. Prehistoric villages by the hundreds, submerged beneath Swiss lakes, but yet not destroyed, give us tools of a race, unknown to human history, who lived thousands of years ago. These are now in the Swiss museums.

The first tool used by prehistoric man was undoubtedly a smooth stone, selected for the practical purpose of being employed against his foe, or of aiding him in killing wild animals for his daily sustenance. There seems to be ample evidence that, long before recorded history, man was making progress as he went from the rude stone period to the polished stone period and from that to the metal age. We have all seen the side of a hill where rocks are bare, with different strata of ore, one on top of the other. Geologists can tell us just how long ago each of these layers was formed, so when they find a stone tool used by prehistoric man, they can tell us approximately how many thousands of years ago it was probably made. Tools of prehistoric man are found deep down in the gravel below a stream or in caves under layers of earth that have accumulated for hundreds of years. Often with these old tools are found the bones of animals, the cave bear or the cave hyena, and by these tools we have ample proof that people must have lived in those caves when those animals roamed the forests.

Prehistoric tools and implements reveal to us a general knowledge of the habits and mode of life of the people by whom they were made and enable us to understand something of the condition of the world long before the era of written history. During the vast period of time before man began to use metals, flint was the outstanding stone he employed in the manufacture of tools and weapons. At first, without doubt, for ages man used stones just as he found them, but later on, some inquisitive genius discovered a method of chipping them and found that they were far more useful than those not chipped.

Crude cutting blades of flint, chipped by human hands, have been found which scientists tell us belong to geological strata laid down in England about 1,300,000 years ago. Between these oldest man-made blades and the most modern cutting devices of the Pittsburgh machine shops, there is available a practically unbroken series showing the development of cutting tools. Progress in cutting tools has been going forward, at an accelerating rate, for thousands of years but in the first 700,000 years that progress, doubtlessly, was very slow.

What Would This World Have Been Like Without Tools?

One can hardly imagine this world without tools. Once all men and women were obliged to work hard through long days and nights to get a little food, a few clothes and a miserable home or place to live in. Today, owing to tools, they can have more and better food and clothing and more comfortable homes. We cannot begin to comprehend the suffering, hunger, cold, danger and misery of those ancient people who had no tools.

When danger and starvation compelled men to invent tools, they laid the foundation on which rest all the safety, comfort, convenience and pleasure that we enjoy today.

When houses were first built is uncertain, but when people ceased to be nomads and settled down in one place, they must have abandoned their tents for more substantial dwellings. Jeri-

cho certainly had houses inside its walls when it was taken in 1451 B.C. The erection of houses must have increased the demand for tools and implements. By means of tools and contrivances man is enabled to increase and vary human power, economize human time and convert common substances apparently worthless, into valuable and useful products. A tool extends the power of the hand and enables us to do things we could not do without such an aid. Without tools the hand would be nearly powerless. Add to it a hammer and a cutting instrument and its capacitv is increased many fold. Whoever first made an eye in and a point on a strip of bone or shell, gave to man an invention of inestimable importance.

Primitive man was a very different being from the intelligent craftsman of today and the tools he handled were crude and few in number and would be almost useless to the mechanic of today, who has been trained to use better things. Primitive man discovered, one by one, the types of implements he found necessary as his climb in civilization became higher. Little by little, he appropriated the things of nature which he found about him, utilizing and shaping them more and more towards perfect tools. Weapons are linked inseparably with tools for as the form and force of weapons improved, more regular supplies of food were insured, more settled habits followed and the need for better tools was recognized. Man was forced to progress, and tool making became a craft.

Different materials were used, first flint and stone, then bronze, afterward iron and now steel. It is interesting to note how many of the really necessary implements used today, found their similar origin in all areas where primeval man has been known to have lived.

Up to the present time, the greater proportion of traces of early man has been found in western Europe and the chief material he used in making tools and implements was flint. Flint to the people of these early days must have been as important and necessary as coal and iron are to us in these days. The earliest type of man in western Europe, whose existence has been confirmed by the finding of skeletal evidence, notably the famous Piltdown skull, lived about 250,000 years ago, it is estimated. Other fragmentary evidence consisting of stone tools and implements, such as a flint hand axe, have been found in numerous rivers, gravel heaps and caves. Most of these were of chipped flint. It is thought early man secured, chiefly by capture or slaughter, the animals about him to feed himself and family. These included reindeer, wild horses and mammoths.

It may be that he was able to only cripple or injure them, then securing them by the use of pitfalls. Bones of these animals are found in abundance around the caves or rock shelters inhabited by the people of this race. On account of the cold climate, these ancient people dwelt or huddled into caves or rock shelters and hence they are known as cave men.

With the invention of tools, man found himself on the high road of progress. In all probability the axe or hammer was his first tool, then the arrow and then the plowshare. With the axe he could build a log hut for shelter. The axe and hammer still hold their place as the most useful tools invented. These crude tools, made long before history began to be recorded, would not compare with the modern axe or hammer of steel, but they served their purpose and they are the forerunners of all tools that have made our modern civilization possible. The arrow which man made from flint by laboriously chipping it, simplified the problem of hunting. Whoever first applied a barb to a spear or a hook introduced a contrivance of very high importance. Then some one, whose name no historian ever recorded, invented the plowshare. The first one was probably a deer antler, and was first used as a pick and then as a plough for digging in the earth.

We must admit that wherever on or under the surface of the earth "tools" are found, it is clear that men once dwelt there. The various tools and weapons that we find indicate to us that man's existence may be placed so far back that centuries are just insignificant periods. Geologists tell us that hundreds of thousands of years have passed since implements were first formed and evidently used by those who lived at that time.

The time of origin of these implements is clear for they are found in geological strata, and not in solitary isolation but in groups, and under circumstances, and in such various localities, as to dispose of any suggestion of fraud or collusion. These silent evidences of facts are precedent to all human traditions.

Much has been written about the sculptures of the Parthenon, yet few, if any, have described the tools or means used in performing that work. It is still a mystery to us how fluted columns with an entasis could be produced, true to a hundredth part of an inch, in the diameters between the groovings. It is often thought that, because thousands of years have elapsed in the history of a tool, we must be in possession of far better forms than those of the past. This is true in many cases but by no means always. The forms of the chisel were perfected 2,500 years ago. The beauty of work executed in the bronze chisel age has never been excelled. The use of saws and crown drills with fixed teeth of corundum or gem stones, for cutting quartz rocks, was the regular system of work in Egypt 6,000 years ago and in Greece 4,000 years ago. We are told that the cores so produced were so perfect and clean that any modern engineer would be proud to turn out such good work with our best diamond drills. The saws were over eight feet long, the granite sawing blocks, seven and a half or eight feet long. By 4,500 B. C., the carpenter's saw had regular teeth, sloping equally both ways. The world did without shears for many ages, cloth being cut with a rounded-blade knife. About 400 B. C. a mechanical genius invented shears. Two or three centuries later, openings for the fingers were added.

Annotated Bibliography of Aluminum Cleaning*[a]

Prepared by JAY C. HARRIS[1] and ROBERT B. MEARS[2]

Conclusion

The preparation of this bibliography was undertaken to provide Section G on Metal Cleaners of Subcommittee II on Specifications of the A.S.T.M. Committee D-12 on Soaps and Other Detergents with information regarding existent specifications and methods for cleaning aluminum. Included is pertinent information dealing with the various types of commercial cleaning methods, means for inhibiting corrosion and descriptions of established laboratory techniques for the evaluation of detergents used for cleaning this metal.

(References 1-109 appeared in the June and July issues of "Metal Finishing")

(110) J. R. Akers and R. B. Mears, "Cleaning Aluminum," *Soap*, Vol. 17, pp. 25-27, 71-74 (1941).

Knowledge of the behavior of aluminum is based upon the characteristics of the thin protective oxide film present upon all aluminum exposed to the atmosphere. Is usually the case that substances having no effect upon the oxide likewise have little or no effect upon the metal. Presence of oxygen actually protects aluminum in contrast to other metals. Halogen salts of the alkali metals, particularly in the presence of minute amounts of Cu, Sn or Ni compounds cause localized attack. Inhibitors for corrosive salt solutions are sulfonated oils or sodium chromate. Sodium hexametaphosphate is a useful inhibitor in waters containing dissolved heavy metal salts. Inhibitors in alkaline solutions are sodium disilicate and sodium silicofluoride. Corrosion by tap water often produces a brown to black closely adherent film. This optical effect is due to etching of the metal. Dark coatings are also formed when uninhibited alkaline cleaners are used, these comprising precipitated iron, copper, and possibly silicon which were present in the aluminum alloy being cleaned. When cleaning aluminum, for certain purposes, compounds or chemicals which will uniformly remove small amounts of metal are often useful, but also important to have available detergents which will injure neither the finished article nor metal in process.

Classified cleaners as: "*Safe*"—those useful upon bare or Alumilite-coated surfaces in any concentration without injury to the surface. Solvents such as toluene, naphtha and kerosene are in this group, as well as stabilized chlorinated hydrocarbon solvents and even aqueous solutions of ordinary soaps or alkaline detergents. Soda ash or trisodium phosphate can be placed in this class when sufficient corrosion inhibitor is added. Water or organic solvent solutions of many of the newer synthetic soaps, wetting agents or sulfonated oils are usually in this class, especially if a small amount of a suitable inhibitor is added.

"*Partially safe*"—those cleaners which will injure bare or Alumilite-coated metal under some conditions but may safely be used in a fairly wide range of concentrations.

"*Harmful cleaners*"—those which are used to remove uniformly small amounts of metal from the surface of the aluminum. These cleaners may be either chemical solutions which etch or dissolve surface layers or abrasive pastes or powders which remove surface layers by mechanical action. Most common etching types are hot, dilute, NaOH solutions. Usual surface renewing treatment employs a solution containing 10 per cent nitric acid plus 1 per cent HF at room temperature. Another contains 10 per cent sulfuric acid and 1 per cent NaF at room temperature.

(111) Detergents, Special; (for Aluminum Ware, Dishwashing Machines, and Manual Cleaning), Federal Specification P-D-236 (1941).

B-1 Detergents for aluminum ware shall be of the following types and classes: Type I—detergent for use in mechanical dishwashing machine; Type II—detergent for manual cleaning, Class A—Nonabrasive cleaner, Class B—Abrasive cleaner.

F Methods of sampling, inspection and tests; Methods are given in detail for the following: F-2*b* Type I, F-2*b* Type II, class A, F-2*c* Foaming Type I, F-2*d* Water-softening capacity (Type I), F-2*e* Water-softening capacity (Type II), F-2*f* (1) Corrosion (Type I), F-2*f* (2) Corrosion (Type II), Class A, F-2*f* (3) Corrosion (Type II), Class B, F-2*g* Hydrogen ion content and buffer index (Type I), F-2*h* Hydrogen ion content (Type II, Class B), F-2*i* Abrasion (Type II, Class B), and F-2*j* Rinsability (Type II, Class B).

(112) F. W. Gilcreas and J. E. O'Brien, "Laboratory Studies of Methods for Cleansing of Eating Utensils and Evaluating Detergents," *American Journal of Public Health*, Vol. 31, pp. 143-150 (1941); *Chemical Abstracts*, Vol. 35, p. 2244 (1941).

Definition of an effective detergent for cleaning of eating, drinking and cooking utensils resulting from this study is: A substance or compound soluble in water, which at a temperature of approximately 120° F. will provide complete removal of all types of characteristic soiling material in a short period of time; will produce free-rinsing surface; will reduce to a minimum the formation of a film of precipitated mineral salts and similar substances on the washed surface; and will function effectively in waters of varying hardnesses. Lists several soil formulas. Cleansing index set up, and detergents are classified as to cleansing ability.

(113) B. S. Haller, F. M. Grant and C. J. Babcock, "The Corrosive Effect of Chlorine and Lye Solutions on Metals Used in Dairy Equipment," *Technical Bulletin No.* 756, U. S. Dept. of Agriculture, 27 pp., January, 1941.

Investigated aluminum, and aluminum alloys containing magnesium and chromium, and an alloy of manganese and aluminum. Sodium hypochlorite and buffered sodium hypochlorite solutions had considerable corrosive effect upon aluminum and its alloys. Less corrosion was produced when Chloramine T was used. Aluminum tends to dissipate chlorine to the greatest extent of the many metals tested, when the solutions were contained in aluminum, or when the metal was immersed in the solution.

(114) G. Russell Hersam, "Efficient Cleaning for Better Metal Finishing," *Industrial Finishing*, Vol. 17, No. 7, pp. 34-36, 38, 40, 42, 44 (1941); *Chemical Abstracts*, Vol. 35, p. 4517 (1941).

General recommendations as to types and upkeep of equipment for most effective metal cleaning.

(115) W. M. Humphrey and Robert E. Lee, U. S. Patent 2,257,960 (1941).

Relates to cleaning of aluminum cooking utensils and cleaning and removal of various oxides from the surface of aluminum and aluminum alloys. The composition is compounded from phosphoric acid, cryolite and bentonite, the fluorine cleaning the surface.

(116) P. D. Liddiard, "Alkalies in Cleaning Processes," *Chemistry and Industry*, Vol. 60, pp. 480-482, 684-688, 713-716 (1941).

General principles of cleansing and comparison of alkalies as to wetting and emulsifying agents, rinsability and active alkali content. Mentions that the chemical action of alkalies on metals such as aluminum, zinc, tin and a few others varies to a greater or lesser extent. Gives a table showing time for removal of mineral and vegetable oils from brass disks at varying temperatures and concentrations of alkali. Aluminum and its alloys require special consideration since they are readily attacked by NaOH and in fact by even mild alkalies such as borax. Silicates are used to overcome this difficulty, the formation of a molecular layer of hydrated silica against the metal surface

Reprinted from ASTM Bulletin, Jan. and Mar., 1943, by permission of American Soc. for Testing Materials.

* This paper also appears in the A.S.T.M. Standards on Soaps and Other Detergents, p. 107. (Issued as separate publication).

a There are several Armed Forces specifications which are pertinent to this bibliography, but these cannot be abstracted for reasons pertaining to national defense.

1. Chairman, Section G on Metal Cleaners, Subcommittee II on Specifications, Committee D-12 on Soaps and Other Detergents, Monsanto Chemical Co., Dayton, Ohio.

2. Metallurgical Division, Aluminum Research Laboratories, Aluminum Company of America, New Kensington, Pa.

preventing further attack. Considers alkalies according to the following analysis: (1) active and inactive alkali content, (2) buffering, (3) wetting and emulsification, (4) stability, (5) rinsing, (6) effect of agents with hard water, (7) colloidal properties, (8) miscellaneous special features, and (9) principal applications.

(117) P. Mabb, "Alkaline Cleaners for Cleaning Metal Components," *Metallurgia*, Vol. 23, pp. 81-83 (1941).

Properties of ideal alkaline cleanser are: (1) must be completely and easily soluble in water; (2) effective at as low a concentration as possible; (3) should be chemically stable to heat and aeration; (4) must be capable of immediately wetting the article; (5) should possess high emulsifying power; (6) should have high deflocculating power; (7) should not attack the base metal to the detriment of the appearance, dimensions or mechanical strength; and (8) should not produce vapors irritant to the operators. Wise selection of cleaners is required for aluminum and aluminum-base alloys, tin, tinplate, soldered articles, zinc or zinc-coated metals and zinc-base alloys.

Mentions 50/50 metasilicate-soda ash mixture in 1 to 2 oz. per gal. concentrations for machine cleaning of magnesium and aluminum-base alloys as well as copper, brass, steel, etc. For zinc-base alloys special procedures are resorted to, and electrolytic cleanses are used wherever practical, otherwise solvent cleanses are used. Typical cathodic process uses a solution of 4½ oz. trisodium phosphate and 1½ oz. metasilicate per gallon of water at the boil. Immersion time is kept to a minimum and current density adjusted to just cause free gassing over the surfaces. Work then water rinsed and pickled for a minimum immersion time (few seconds to 1 min.) in cold 8 per cent hydrochloric acid solution.

(118) O. M. Morgan and J. G. Lankler, "A Quantitative Method for the Evaluation of Metal Cleaning Compounds," National Aniline Division, Allied Chemical and Dye Corp. (1941).

Method of oiling metal—2 by 4-in. test strips are scrubbed in 0.050 per cent Nacconol NR solution at 110°F., rinsed in warm water, rinsed in alcohol and allowed to dry. Strips of wool flannel 1⅞ by 3⅞ in. are saturated with mineral oil composition (containing Fluorescent Oil Green HW) as used in brass rolling. These strips are alternated with metal strips to form a stack with metal plates and protecting oil saturated wool strips above and below the experimental strips. The stack of strips is placed in the hydraulic press, the edges of plates being carefully squared up. A pressure of 500 psi. is applied and maintained until no more oil oozes from the edge of the stack, the edges being constantly wiped with a clean cotton cloth. The pressure is released and the stack removed and retained in perfectly horizontal position until taken from the stack one at a time for cleaning experiments. Oil adhering to the surface of the metal does not vary more than 3 per cent by weight.

Method of cleaning—A soaking operation was used. The strips were suspended from hooks into 800 ml. of solution at constant temperature in one liter beakers. Metal strips are withdrawn, rinsed for one minute in running water at 100°F. and then air dried.

Method of recording—The strips are either examined visually or photographically under ultra violet light. The remaining oil (and fluorescent dye) fluoresces under this light in proportion to the amount remaining on the surface. Using a Hanovia Analytic Model Quartz Lamp situated 30 in. from the strips and incident to the surface of the subject at an angle of 45 deg., a camera is equipped with a Wratten K-2 filter, Tri-X film and a picture is taken at f. 4.5 with 10-min. exposure. The film is developed using DK-60A for maximum contrast.

(119) O. M. Morgan and J. G. Lankler, "Improved Aluminum Cleaning with Nacconol NR," National Aniline Division, Allied Chemical and Dye Corp. (1941).

A 95-5 mixture of sodium metasilicate and Nacconol NR gives optimum removal from aluminum of a mineral oil composition such as that used in brass rolling. Technique used is described in "A Quantitative Method for the Evaluation of Metal Cleaning Compounds" by these authors.

(120) W. F. Sherman, "Metal Cleaning," *The Iron Age*, Vol. 148, July 24, 1941, pp. 38-40.

A description is given of Kolene Cleaner (Kolene Corp., Detroit, Mich.) which is a molten bath process of catalyzed salts. The action of the cleaner is the oxidation of all materials on the surface to a readily removable substance. The first action is degreasing by oxidation and the second is conversion of insoluble scale to the soluble state.

(121) J. F. J. Thomas, "The Effect of Dishwashing Compounds on Aluminum," *Canadian Journal of Research*, Vol. 19, No. 7, p. 153 (1941).

Several proprietary dishwashing compounds in 0.5 per cent solution were found to appreciably attack commercial aluminum and aluminum utensils. Curves are shown to illustrate this attack, also the corrosive action on commercial aluminum (2S½H) of 0.5 per cent aqueous mixtures, in various proportions, of the salts usually present in such compounds. Sodium metasilicate was found to be a more effective inhibitor than either trisodium phosphate or sodium pyrophosphate. Replacement of soda ash by either trisodium phosphate or sodium pyrophosphate so as to give a final soda ash content of 40 to 45 per cent was required before less sodium metasilicate than about 20 per cent produced inhibition of attack. The author concludes that the addition of about 25 per cent sodium metasilicate to such proprietary compounds is advisable.

Technique—Immersion of panels in aqueous 0.5 per cent solutions at 60°C. ± 2°C. for 60 min. Ratio of area of exposed metal to the volume of test solution was generally 2 sq. dm. per liter. Panels etched 2 min. in an aqueous 10 per cent NaOH solution prior to testing. Loss in weight determined. Discoloration of panels gave no indication of degree of attack.

(122) H. J. Fahrney and R. B. Mears, "Protective Measures for Aluminum Equipment," *Chemical and Metallurgical Engineering*, Vol. 49, No. 7, pp. 86-89 (1942).

Protective measures are discussed. These include: (1) Cathodic protection. Zinc strip attached to the wall of the vessel is useful in neutral or acid solutions and sometimes in weakly alkaline solution to prevent corrosion, (2) Inhibitors, three widely used inhibitors are chromates, silicates and soluble oils, (3) Protective coatings; Phenolic coatings are discussed, (4) Periodic cleaning: Cleaning periodically with a warm solution of 47 g. tartaric acid and 3 g. sodium fluoride per liter is useful, or where the vessel is of small size steel wool and soap are likewise useful in the removal of surface imperfections.

(123) Edward Finnie, "Tin Coating of Aluminum," *Products Finishing, Vol.* 6, No. 6, pp. 42-44 (1942).

The pistons are first cleaned by immersion in a 3 oz. per gal. solution of Na_3PO_4 at 175 to 185°F. until gas bubbles form on the Al, since the surface of pistons remaining too long in the solution would be etched. The pistons are then rinsed in cold water, dipped in a 3 per cent HNO_3 solution for 30 sec. to prevent any alkali of the cleaning solution from contaminating the Sn bath, rinsed thoroughly in cold water.

(124) H. R. Hanley, "Electrolytic Cleaning of Metals," *Metal Progress*, Vol. 41, February, 1942, pp. 179-183.

Depending upon polarity there are three methods: (1) cathodic, (2) anodic, (3) alternate current. Pickling in hydrochloric acid does not cause embrittlement. No hydrogen environment is present and consequently no embrittlement results from anodic cleaning. Describes several commercial processes, among which are the Bullard-Dunn, the Blant-Long process (U. S. Patent 2,115,005), and the S.F. Urban process (U. S. Patent 2,172,041). Also discusses inhibitors.

(125) R. B. Mears and J. R. Akers, "The Design and Maintenance of Aluminum Brewing Equipment," presented at meeting of Am. Soc. Brewing Chemists, May 25, 1942.

Describes methods of cleaning and maintaining aluminum equipment. Contains a description of cleaners, disinfectants and beer stone removers. Methods of cleaning aluminum beer barrels are given special attention.

(126) C. C. Ross, U. S. Naval Engineering Experiment Station, Annapolis, Md., Communication, April 2, 1942.

Duraluminum panels were soiled by the following method, developed at the Station: (1) Heat duraluminum to near the softening point, (2) Plunge the specimen into the bath containing 1 per cent of Oildag in N. S. 1100 oil, (3) Burn off oil and bake residue at lower temperature, and repeat several times, and (4) Allow the specimen to cool in the bath. The above methods produce a uniform soil which is impervious to ordinary soap and water. The efficiency of several cleansers was determined using this soil.

(127) F. M. Scales, "Acid Detergent Makes Cans More Sanitary," *Food Industries*, Vol. 14, No. 4, pp. 51-53, 97 (1942); *Chemical Abstracts*, Vol. 35, p. 6678[8] (1941).

Use of an acid detergent, "Mikrosan," proved superior to the usual alkaline types in washing milk equipment.

THIS IS WASHINGTON—

By George W. Grupp
METAL FINISHING's Washington Correspondent

A. Kenneth Graham Resigns A. Kenneth Graham has resigned as Deputy Chief of the Products Branch and as Head Industrial Specialist on Plating and Finishing of the Conservation Division of WPB. Dr. Graham left the WPB to engage in some special research work.

Soderberg is with WPB Gustaf Soderberg, who is Director of Research of the Udylite Corporation of Detroit, has been granted an extended leave of absence by his firm in order that he can be of service to the United States Government. He is Head Industrial Specialist on Electroplating and Finishing and consultant on lead coating in the Conservation Division of the War Production Board. Some believe that Mr. Soderberg will seek the appointment of an electroplating advisory committee made up of prominent members of the metal finishing industry.

Brass Mills Change Symbols Directive No. 4 on CMP Regulation No. 1, amended June 25, 1943, provides that program symbol N-4 is to be used instead of N-1 by brass mills. It also extends CMP Regulation No. 1 for an indefinite period as it concerns the production and orders of brass mills.

Brass Mill Products and Services Prices The Office of Price Administration issued a new regulation stabilizing distributors' maximum prices for brass products and services at October, 1941 levels in the issuance of Maximum Price Regulation 408 on June 21, 1943. The new maximums use the base prices and schedules of extras and discounts listed in the price catalogues of American Brass Co., Bridgeport Brass Co., Chase Brass & Copper Co., Inc., Revere Copper & Brass, Inc., and Scovill Manufacturing Co.

More Copper Goods Restricted Supplementary Order M-9-C-4, as amended June 24, 1943, expanded the list of copper and copper base alloy building materials which civilians are prohibited from using. For example, the list now includes closet floor flanges, cast brass rigid traps, shower arms less flanges, shower curtain rods, anchors and dowels, grilles, grids, gratings, ornamental metal work, ventilators and skylights.

WPB Aims to Increase Copper Supply The WPB recently announced a program to increase the supply of copper and copper alloy base materials from idle and excess inventories in the hands of building contractors, plumbers and their suppliers. The Copper Recovery Corporation will purchase fittings which can be used in their present form at a price 10 per cent greater than the price paid by the owner. Fittings which cannot be used in their present form the government will buy at reasonably good prices.

Chemical Industries Inventories Decline The value of manufacturers' inventories in non-ferrous metals industries has declined steadily since January, 1943 and the value of the chemical industries has been on the downward trend since December, 1942, according to the latest reports of the Department of Commerce. The Department of Commerce index numbers reveal that the value of chemical industries shipments dropped from 211 in April, 1943 to 199 in May, 1943.

INDEX NUMBERS
(Average month 1939—100)

YEAR AND MONTH	VALUE OF MFRS' INVENTORIES		VALUE OF MFRS' SHIPMENTS	
	Nonferrous Metals & Their Products	*Chemicals and Allied Products*	*Nonferrous Metals & Their Products*	*Chemicals and Allied Products*
April, 1942	151.1	157.7	201	173
May	152.4	159.9	217	170
June	152.1	162.7	217	168
July	153.3	163.3	220	169
August	156.5	164.4	212	171
September	156.5	161.0	228	187
October	152.6	156.5	236	182
November	152.3	155.1	246	183
December	151.9	158.7	262	185
January, 1943	157.3	155.4	230	193
February	150.1	154.7	262	210
March	149.6	152.4	255	210
April	149.2	149.1	269	211
May	148.5	149.1	254	199

Copper Scrap Toll Charges On July 14, 1943 Amendment No. 2 to Maximum Price Regulation No. 20 set new ceilings on permissible fees and charges for conversion of copper scrap and copper alloy scrap into toll transactions. Under the new ceilings the highest toll charge is 2¼ cents a pound for conversion of 9¾ cents scrap copper.

Corundum Industry Reborn A corundum industry was reborn in the United States by the recent reopening of a corundum mine in South Carolina which had been idle since the first World War. The new venture which is being operated by Withers, Inc., recently signed a contract to supply the Metals Reserve Co. with a considerable amount of this material. Prior to the reopening of this mine, the United States depended entirely on Africa for its supply of corundum. And to increase further the supply of this abrasive material, the WPB is investigating the possibilities of developing the corundum deposits in Georgia and Montana.

Electric Generator Order Simplified General Conservation Order L-221 was amended on June 18, 1943 to permit buyers of machinery into which is incorporated a special electric motor or generator to secure such equipment without filing a certification stating the use and purpose of the motor or generator.

Fan and Blower Order Amended Manufacturers of fans and blowers are no longer required to file monthly detailed delivery reports. General Limitation Order 280, as amended June 21, 1943, provides that it is now only necessary to file delivery schedules on Form PD-901 under the terms of General Scheduling Order M-293. The amended order now states, "No manufacturer or dealer shall accept any order for any fan or blower, or parts thereof, or deliver any such orders unless it is rated AA-5 or higher."

Insignia Restrictions Extended On June 24, 1943 the Copper Division of the WPB addressed a letter to all manufacturers of military insignia which states: "The use of copper and copper base alloy in the manufacture of such insignia has been prohibited since June 1, 1943, under the provisions of paragraph (a) (2) of Order M-9-c because the item 'Insignia' is on the List A-2 and is off the Military Exemption List entirely after May 31, 1943. The holding of a prime contract or purchase order, including one placed by the Army or Navy, does not constitute authority under M-9-c to continue the manufacture of insignia after May 31, 1943 regardless of the rating applicable to the contract or order. You may not continue to process, assemble or finish copper or copper base alloy insignia, even for the purpose of filling a prime contract or purchase order from one of the military services, unless an appeal has been granted by the War Production Board."

Jewelry Definition Expanded General Limitation Order L-45, as amended June 25, 1943, now provides that certain watch cases are included in the definition of jewelry under this order. The interchangeable use of gold and palladium is now permitted, provided it is within the limits of the manufacturer's quota permitted by the order.

Laboratory Equipment Orders Amended Materials for scientific and technological laboratories and delivery of laboratory equipment were affected by the amendment of General Limitation Order L-144 and Preference Rating Order P-43 on June 26, 1943. Amended P-43 gives laboratories a preference rating and symbol. Amended L-144 restricts the delivery of any one laboratory item in excess of $50 or laboratory equipment worth a total of $200 unless authorized by the WPB on Form WPB-1414, formerly PD-620.

Interpretation of L-144 The word "distributor", wherever it appears in Order L-144 includes only distributors located in the United States, its territories or possessions. The order permits delivery to "distributors" without requiring specific authorization on Form WPB-1414 (formerly PD-620). The purpose of this provision is to eliminate the necessity of double authorizations on the sale of equipment from producer to distributor followed by resale from distributor to user. It was contemplated, however, that the distributors would be reselling either to the Army or Navy or serial-numbered laboratories, or to other persons who had received specific authorization on Form WPB-1414, and therefore the War Production Board would have control over the ultimate disposition of the equipment. In the case of sales to distributors in foreign countries, the War Production Board has no control over sales by the distributor to the ultimate user. For this reason distributors in foreign countries must receive specific authorization on Form WPB-1414, just as in the case of any other foreign purchaser.

Metal Spectacle Ware Order Amended General Limitation Order L-214 (Schedule II) was amended on June 18, 1943 to permit the use of optical metal (an alloy containing about 90 per cent copper, 4 per cent zinc, and 6 per cent tin), or brass, as an inner liner in gold-filled or rolled gold construction parts, and silver brazing alloy, to the extent required in metal spectacle ware.

When Motor Replacement is Maintenance Interpretation No. 3 on General Limitation Order L-123, issued on July 14, 1943, states that the sale of fractional horsepower motors to replace worn out ones is considered a maintenance and repair transaction provided those who make the repairs accept and keep the old motors.

Extension of MRO Ratings Directive No. 9 to CMP Regulation No. 5, issued July 10, 1943, permits employees of industries listed on either Schedule I or Schedule II of CMP Regulation No. 5 to use under certain circumstances the CMP Regulation No. 5 preference ratings assigned to their employers for maintenance, repair and operating supplies for the purpose of buying hand tools they need to retain their job or to obtain employment. The cost of the hand tools bought by an employee under such circumstances must be included by the employer in calculating costs under MRO (maintenance, repairs and operating supplies).

New One Cent Coins Confusing Some people in Washington are of the opinion that the new one cent coins are not entirely satisfactory for the reason that they are easily confused with ten cent coins because of their size and finish. As a result new one cent coins are sometimes passed off as ten cent coins to merchants and others whose eyes do not sharply watch the money being handed to them.

Patent Commission's Recommendations The National Patent Planning Commission created by executive order on December 12, 1941 by President Roosevelt recently submitted its first report. In this report the commission expressed the opinion that the basic principles of our present patent system should be preserved. At the same time, it recommended that legislation should be passed which would adjust those principles to present-day conditions. Here are the chief changes which the commission recommended:

(1) There should be compulsory recording with the United States Patent Office of (a) all agreements with nationals of foreign countries, and (b) all agreements on restrictions as to price, quantity of production and activities in geographical areas.

(2) There should be "a statutory provision that in a suit for infringement the recovery of a patent owner shall be limited to reasonable compensation without prohibiting the use of the patented invention whenever the court finds that the particular use of the invention in controversy is necessary to the national defense or required by the public health or public safety."

(3) "The Commissioner of Patents should be authorized to entertain and decide the question initially upon request of one of the interested parties prior to the institution of suit, the decision of the Commissioner to be subject to review by the United States Court of Customs and Patent Appeals."

(4) "That opportunity be accorded any member of the public to challenge the validity of any patent in a proceeding begun within six months after its grant. The enabling legislation should specify that the failure to challenge within the period indicated shall not prejudice the rights of any person in a subsequent infringement suit. Cancellation proceedings should be initiated in the Patent Office with an appeal by either party to the Court of Customs and Patent Appeals. The services of an officer in the nature of a public defender should be made available to the patentee."

(5) "The establishment in the Patent Office of a public register upon which would be placed those patents under which the owner would be willing to grant licenses on stated or reasonable terms. When an interested party and the owner are unable to agree as to the unstated terms for a license under a patent entered on the register, the Commissioner of Patents shall fix the terms after an opportunity for hearing with right of appeal to the Court of Customs and Patent Appeals."

(6) "The enactment of a declaration of policy that patentability shall be determined objectively by the nature of the contribution to the advancement of the art, and not subjectively by the nature of the process by which the invention may have been accomplished."

(7) "The Commission recommends that whenever the validity of a patent is attacked in an infringement suit before a district court, the court shall certify the record to the Patent Office for a report on the validity of the patent. The report of the Patent Office as to the effect of the court record upon the validity of the patent shall be advisory only."

(8) "The establishment of a single court of patent appeals and that the jurisdiction of the existing Court of Customs and Patent Appeals be expanded so as to function as such a court, that provision be made for the court to sit elsewhere than Washington, and that additional judges be temporarily assigned to the court by the Chief Justice of the United States in such numbers and for such times and at such places as the public interest may require."

(9) "That the patent monopoly shall not endure more than twenty years from the date of its filing in the Patent Office."

(10) "That in ex parte cases the jurisdiction of the Court of Customs and Patent Appeals to review the denial by the Patent Office of an application for patent shall be made exclusive, and that the present concurrent jurisdiction of the district courts shall be abolished. Sections 4911 and 4915 of the Revised Statutes should be amended accordingly."

Labor Department's Absenteeism Booklet A much better booklet is the one called "Controlling Absenteeism—A Record of War Plant Experience," issued by the Labor Department's Division of Labor Standards, which may be obtained from the Superintendent of Documents, United States Printing Office, Washington, D. C., for ten cents. This 57-page booklet goes into the various causes of absenteeism and the absentee control devices employed in many plants throughout the United States. The fact that most of the material was taken from the public hearings on absenteeism held by the House Committee on Labor in March of this year, adds to the value of this informative guidebook. This manual reveals that W. P. Carlon of the E. I. duPont de Nemours Company's Spurance Plant, in analyzing his firm's experiences, found that 75 per cent of absenteeism was due to illness, 15 per cent to excused absences, and 10 per cent to AWOL. In making a study of absenteeism over a recent six-weeks period at the Revere Copper & Brass, Inc. of Rome, N. Y., R. G. Ryan found that 1.4 per cent of absenteeism was due to discipline, 7.3 per cent to family illness, 7.6 per cent to tardiness, 3.6 per cent to permissible absence, 48.4 per cent to personal sickness, and 31.7 per cent to transportation.

Platinum Order, Simplified Conservation Order M-162 was supplemented with Amendment No. 1 on June 18, 1943 by eliminating paragraphs (d), (e) and (f) and Schedule A from the original order. This was done to reduce the number of required forms. At the present time, plans are under way to specify a new form.

Repair Materials Interpretation In interpretation No. 8 to CMP Regulation No. 5, issued on July 17, 1943 the WPB ruled that products or materials for repairs or maintenance cannot be obtained under CMP Regulation No. 5 if they are capitalized on the purchaser's books, except as permitted in the making of minor capital additions.

Replacement Orders Speeded Up According to Directive No. 16 to CMP Regulation No. 1, issued on June 17, 1943, all orders for the replacement of controlled materials rejected by a customer because of failing to conform with the specifications take precedence over all other orders. The directive applies to such materials as aluminum, copper, and steel.

Sodium Phosphates Control Ordered Sodium phosphates were placed under allocation control by Preference Order M-334, issued on June 16, 1943. Each producer or primary distributor of sodium phosphates seeking authorization for delivery beginning August 1, 1943, must file his application on Form PD-602. Consumers must file Form PD-600. Specific authorization is not required for the delivery by a primary producer or distributor to any person in any month when the amount is not in excess of 1,000 pounds of any one sodium phosphate.

Steel Drum Order Eased Because no satisfactory substitute containers are available, Limitation Order L-197 as amended July 14, 1943, provides that new and used steel shipping drums may now be used to pack 16 different chemicals such as arsenic acid, arsenic trioxide, organic colors, dry lime sulphur, metal degreasing alkalies, sodium hydrosulphite, and zinc hydrosulphite.

Steel Storage Tank Prices On June 26, 1943 the Office of Price Administration issued Maximum Price Regulation No. 411, effective July 2, 1943, which set the maximum prices for Class A reusable steel bolted storage tanks. (Class A means in a condition suitable for re-use without replacement of sheets, plates and structural supports). The newly established prices are as follows:

Capacity (barrels)	*Standing tanks*				*Allowances*	
	Tanks with steel roof		*Open top tanks*			
	Black plate	*Galvanized*	*Black plate*	*Galvanized*	*Dismantling*	*Cleaning*
65	$92	$117	$82	$104	$17	$8
100	126	160	98	125	21	9
130	160	204	151	191	25	10
200	183	233	153	195	30	10
250	228	290	157	199	30	10
300	240	305	205	260	39	10
500 high ..	334	425	263	334	42	10
500 low ...	377	479	267	340	42	10
750	450	572	381	484	59	10
1,000 high ..	517	657	412	523	59	10
1,000 low ...	671	852	474	603	65	14
1,500	680	863	579	735	81	15
2,000	822	1,045	623	792	112	19
3,000	971	1,233	776	986	156	24
5,000	1,550	1,969	1,082	1,374	261	41
10,000	2,720	3,454	1,491	1,894	467	74

Sulfuric Acid Price Meetings During July the Office of Price Administration held meetings in Atlanta, Chicago, New York, and St. Louis with the producers and sellers of commercial sulfuric acid to discuss a proposed price regulation which may replace the present ceilings on sulfuric acid.

Sulfamic Acid Order Revoked Sulfamic acid and derivatives which are used in *electroplating* have been removed from allocation control by the revocation of General Preference Order M-242 on July 6, 1943, because of the increased production of these materials in the United States.

SWPC Helps 4,100 Firms Brigadier General Robert W. Johnson, chairman of the Smaller War Plants Corporation, reports that since the beginning of this corporation through June, 1943, it has helped 4,100 firms to get prime contracts amounting to $750,000,000. During the period June, 1942 to June, 1943, the corporation received 645 applications for financial assistance totaling $46,854,985, and 331 applications aggregating $14,080,242.21 were approved.

Tinplate Stockpiles Permitted According to Directive No. 19 on CMP Regulation No. 1 issued on June 29, 1943, manufacturers of cans may now order tinplate, short ternes, and tin mill black plate in advance and have it held at the steel mills until required.

Tinned Scrap Under Salvage Division Tinned scrap was placed under the control of the Salvage Division of the WPB by Order M-325, dated June 16, 1943. This order, which is practically the same as revoked Order M-72-a, requires the delivery of all tinned scrap either to detinning or shredding plants or to plants engaged in the precipitation of copper from mine waters. The definition of the term "tinned scrap" was changed to exclude "crown or screw caps or similar closures for tin vans or other containers."

WPB's Pamphlet on Absenteeism Recently two pamphlets were issued by the government on absenteeism. The WPB issued for free distribution a 28-page, illustrated pamphlet called "Guide for Plant Labor-Management Production Committees on the Ways of Dealing with Absenteeism." It is the opinion of Donald M. Nelson that "this guidebook has a definite value because it indicates a positive and constructive approach to absenteeism and suggests a variety of practical ways of combating it."

Weight-Lifting Injuries The United States Department of Labor has issued a 20-page, profusely illustrated pamphlet called "A Guide to the Prevention of Weight-Lifting Injuries," which may be obtained from the Superintendent of Documents, United States Printing Office, Washington, D. C., for ten cents. With a series of 19 photographs, it shows the right and wrong way to lift materials. The text reviews the effect of lifting injuries on the progress of war production, the causes for lifting injuries, and the methods of preventing such injuries.

Zinc Dust Permissible in Small Amounts Conservation Order M-11-1, as amended July 12, 1943, provides that any dealer or producer may deliver or ship a small amount of zinc dust to any person without an allocation certificate provided that person certifies in writing to the dealer or producer at the time of delivery (1) that inclusive of the amount received, he has not received more than 75 pounds in that calendar month, (2) that no allocation certificate was issued to him by the WPB during that month, and (3) that he explain in writing the end-use of the desired zinc dust.

ACKNOWLEDGMENT

Frederick Gumm

At the time the July issue of *Metal Finishing* went to press, we had not received the stenographic report of the proceedings at the Victory Luncheon which was held at the Buffalo Convention of the A. E. S. This necessitated our filling in, at the deadline, with only a brief report of the luncheon.

Due to the last minute rush, we neglected to mention that this delightfully entertaining and instructive luncheon was tendered by Fred Gumm of the Frederick Gumm Chemical Co. Inc., Kearny, N. J.

We believe that the time and effort expended by Mr. Gumm to make this Victory Luncheon one of the highlights of the convention are deserving of acknowledgment and we are therefore taking this opportunity to give credit where credit is due.—The Editors.

Patents

Cleaning Aluminum

U. S. Pat. 2,316,219. R. H. Brown & R. B. Mears, assignors to Aluminum Co. of America, April 13, 1943. A dry water-soluble aluminum-surface cleanser for use in aqueous solution, said cleanser being characterized by an acidic cleansing reaction in said solution and consisting substantially of an alkali metal fluoride and metaphosphoric acid, the latter being the major component and the principal active cleansing agent.

Example:

Metaphosphoric acid	50 g.
Sulfamic acid	25 g.
Water	1 L.

100° C. Approx. 5 min. immersion.

Cleaning Aluminum

U. S. Pat. 2,316,220. R. H. Brown & R. B. Mears, assignors to Aluminum Co. of America, April 13, 1943. A dry water-soluble aluminum-surface cleanser for use in aqueous solution, said cleanser being characterized by an acidic cleansing reaction in said solution and consisting substantially of an alkali metal fluoride and ammonium dihydrogen phosphate, the latter being the major component and the principal active cleansing agent.

Example:

Ammonium dihydrogen phosphate	25 g.
Ammonium bisulfate	25 g.
Water	1 L.

100° C. Approx. 5 min. immersion.

Semibright Nickel Bath

U. S. Pat. 2,316,303. A. Wesley & J. W. Carey, assignors to The International Nickel Co., Inc., April 13, 1943. As a new article of manufacture, a composite article comprising a metallic core and a thick electrodeposited nickelous protective layer said nickelous protective layer being about 0.0036 inch to about 0.006 inch thick, containing grains of a size greater than 0.0001 millimeter, having preferred crystallographic orientation with the [112] direction substantially normal to the surface of said core and having two maxima of light reflectively at about 20° to the normal of said layer.

Example of bath:

Nickel chloride	300 g./L.
Boric acid	30 "

pH = Approx. 1.0 electrometric
Temp. = 80-145° F.
C. D. = Up to 200 amp./sq. ft.

Removing Deposits from Steel

U. S. Pat. 2,316,579. E. C. Hall, assignor to Western Electric Co., Inc., April 13, 1943. In a method of removing a combination of nickel and chromium coatings from a ferrous composition base, the step of anodically electrolyzing the coated base in a solution consisting essentially of 1 to 5 ounces of boric acid and 1 to 4 pounds of chromium trioxide per gallon of water while maintaining the temperature of the solution between 155° F. and 185° F.

Example:

Boric acid	3 oz.
Chromic acid	2 lb.
Water	1 gal.

Reverse current at 200 amp./sq. ft. and 170° F. Patent claims that 40 msi of nickel plus 15 msi of chromium are removed in less than 15 minutes. A smut forms on the surface when the deposit has been removed, and is removed by immersion in hydrochloric acid if the article is to be replated.

Anodizing Rack

U. S. Pat. 2,316,609. R. V. Miner, assignor to Western Electric Co., Inc., April 13, 1943. In a rack for supporting round and substantially flat articles in an electrolyte in an anodic oxidation process, a bar of conducting material, means for supplying current to said bar, a pair of spaced and parallel articles supporting members of rigid insulating material capable of absorbing said electrolyte depending from the bar and having longitudinal grooves in their opposed faces for receiving a plurality of said articles and positioning the articles with peripheral portions of each article in contact with peripheral portions of adjacent articles, the width of said grooves being greater than the thickness of said articles and the base of each groove being configured in the form of an inverted V to engage the articles as they are inserted in the groove and direct the inserted articles selectively toward either side of the grooves, a formed pressure member of conducting material positioned in the grooves having a beveled portion at one end for engaging the periphery of an end article in the groove and a bent portion at the other end with a surface recess therein, a connector of conducting material having one end portion engaging the pressure member recess and the other end portion engaging the conductor bar, and a helical spring encircling the connector for urging the connector into electrical contact with the conductor bar and the pressure member and forcing the pressure member against the end article to cause the current to travel throughout the series of articles in the grooves.

Purifying Manganese Solutions

U. S. Pat. 2,316,750. P. M. Ambrose, assignor to Chicago Development Co., April 20, 1943. A method of purifying manganese electrolyte solutions to remove at least one metal which is more noble than manganese, which comprises providing an anode compartment containing an anode and a cathode compartment containing a cathode, separating said compartments by a material only slightly pervious to the electrolyte, and electrolyzing the manganese electrolyte for a period of time sufficient to effect the purification to the desired extent, the cathode current density being insufficient to maintain a deposit of manganese on the cathode in the presence of more noble metals, the ratio of the cathode current density to the anode current density being about 1 to 10.

Strip Plating Tank

U. S. Pat. 2,317,242. W. S. Allen, R. A. Dimon, and E. S. Taylerson, assignors to Carnegie-Illinois Steel Corp., April 20, 1943. In a plating tank for electroplating metallic strip, means for establishing the strip as the cathode, means for moving the strip in a substantially vertical path, a plurality of spaced vertically extending anodes within said tank, means below the bottoms of said anodes for positively circulating the electrolyte upwardly on either side of the strip, said last-named means including a pair of spaced parallel horizontally extending pipes having on the adjacent sides thereof orifices for the distribution of electrolyte, and guard means between said last-namd means and the bottoms of said anodes for preventing damage by dropping the latter.

Copper Plating Wire

U. S. Pat. 2,317,350. O. E. Adler and M. J. Krinowitz, assignors to National-Standard Co., April 27, 1943. A copper clad wire comprising a ferrous base, an adherent layer of copper deposited from a cyanide solution upon the base, a thin layer of copper thereon deposited from an acid solution, a thin layer of copper upon the acid deposited copper which has been deposited from a cyanide solution, and a relatively thick layer of acid deposited copper thereon.

Corrosion Prevention of Iron

U. S. Pat. 2,316,811. G. C. Romig, assignor to American Chemical Paint Co., April 20, 1943. In the art of rapidly coating ferrous metal with an adherent, water-insoluble, metallic phosphate, the method which includes treating the surface with a cold solution of acid phosphate of metal from the class which consists of zinc, manganese, cadmium and calcium, the temperature of which solution does not exceed about 120° F.; said solution being upwards of about 20% super-saturated with respect to coating metal phosphate at the temperature of use but not so highly supersaturated as to result in the production of a loose, non-adherent coating; said solution containing an oxidizing agent from the class which consists of bromates, iodates, picric acid, quinone and nitrites, the quantity of said agent being at least sufficient to cause the solution to attack and dissolve iron from the metal being treated at a rate which is not less than the rate at which it would be dissolved by the presence in the solution of from about .12 gram to about 5 grams per liter of sodium nitrite but not sufficient to produce an oxide film at the existing temperature; processing a succession of pieces with said solution; and adding to the solution as processing continues regulated quantities of the phosphate, of said agent and of a compound capable of raising the pH of the solution, such additions being adjusted so as to maintain the supersaturation and the content of oxidizing agent as specified.

Example:

75% phosphoric acid	0.500 lb.
Water	0.500 "
Zinc oxide	1.667 "
or Manganous carbonate	2.35 "

This mixture is diluted with water to form a 2% by volume solution for final use. The pH is raised with caustic soda to 3.8 electrometric at 60° F. or 3.0 at 120° F.

Phosphating Solution

U. S. Pat. 2,316,810. G. C. Romig, assignor to American Chemical Paint Co., April 20, 1943. A material for preparing or replenishing an acid zinc phosphate coating solution, said material comprising zinc phosphate and a compound of a metal capable of yielding ions chosen from the group which consists of ferric, aluminum, chromic, stannous and antimonious ions, the amount of said compound being sufficient to yield in the finished solution sufficient of the said ions to substantially reduce spontaneous precipitation or crystallization of zinc phosphate from the solution and thereby retard loss of supersaturation.

Example:

Zinc oxide	1.667 lb.
75% phosphoric acid	0.500 "
Water	0.500 "
Ferric chloride	0.060 "

Iron Bath

U. S. Pat. 2,316,917. E. H. Wallace & R. K. Iler, assignors to U. S. Rubber Co., April 20, 1943. A method of electrodepositing iron from a prepared solution of ferrous chloride containing a ferric ion concentration of between .01 and .45 gram per liter and having a pH value of between .8 and 1.4 comprising passing current between a cathode and a soluble ferrous anode immersed in said solution, and maintaining in the solution during substantially the entire operation a ferric ion concentration and a pH value within the said range for ferric ion concentration and pH, to provide a substantially self-sustaining deposit of iron by continuous operation.

Example:

Ferrous chloride	325-425	g./L.
Calcium chloride	125	"
Ferric chloride	0.0485-2.18	"

pH = 0.8-1.4. Temp. = 85-90° C.

To maintain the ferric ion concentration an auxiliary insoluble anode is used, such as carbon, with a resistance in line which is adjusted to the proper value.

Manganese Bath

U. S. Pat. 2,316,937. R. S. Dean, assignor to Chicago Development Co., April 20, 1943. The method of electrodeposition of manganese from solutions of salts thereof which comprises providing an aqueous solution containing manganous sulphate, ammonium sulphate substantially in excess of the manganous sulphate and a small proportion of hydroxylamine sulphate, introducing said solution into the catholyte compartment of a diaphragm cell, said cell being provided with cathodes and anodes, and passing a current between said anodes and cathodes to electrolytically deposit manganese in the form of a metal onto the cathodes.

Example:

Manganese as sulfate	25	g./L.
Ammonium sulfate	200	"
Hydroxylamine sulfate	0.5	"

The hydroxylamine is claimed to be as effective as saturating the solution with sulfite ion by means of sulfur dioxide additions.

Vitreous Enameling

U. S. Pat. 2,317,114. J. E. Rosenberg, assignor to Homelaya, Inc., April 20, 1943. The method herein described of producing one-coat enameled iron articles of red and yellow color adequately bonded to the iron, which consists in spreading upon the surface of the iron article to be enameled a vitrifiable coating that carries an iron-eroding content of sodium antimonate, spreading upon such coating still in unfired condition a second coating that carries as a pigment a cadmium selenide, and firing the article so coated, whereby the iron-eroding content has unimpaired bonding effect and the unreacted pigment colors the surface of the fired article.

Manganese Bath

U. S. Pat. 2,317,153. R. S. Dean, assignor to Chicago Development Co., April 20, 1943. A process of electrolytically depositing manganese which comprises conducting the electrolysis in a non-diaphragm cell, having an insoluble anode, the electrolyte consisting essentially of an aqueous solution of an alkylolamine and at least about 5 grams of manganese in the form of manganese sulphate per liter and the current density being at least about 2 amperes per square decimeter.

Example:

Diethanolamine	200 g.
Sulfuric acid	60 "
Manganous sulfate	50 "
Water	1 L.

pH = 7.9. C. D. = 11.1 amp./sq. dm.

Lead anodes are used and the drop in pH is corrected by additions of finely divided manganese dioxide. The cathode efficiency of this bath is stated to be about 53% and the deposit is bright and dense.

Sand Blasting

U. S. Pat. 2,317,837. R. Webster, assignor to The Hydro-Blast Corp., April 27, 1943. A sand blasting system comprising a water supply line, a high pressure pump connected to said line, a sand blasting gun connected to said high pressure pump, said sand blasting gun having means therein to incorporate abrasive particles in the high pressure water stream passing there through, means to dissolve a corrosion inhibiting chemical in water to form a substantially saturated solution, heat exchange means to control the temperature of said solution and to maintain the temperature of said solution below atmospheric temperature, pump means for withdrawing said saturated inhibiting solution and for forcing said inhibiting solution into said supply line, and heat exchange means adapted for elevating the temperature of the mixed water and inhibiting fluid to approximately the body surface temperature of the operator.

Degreaser

U. S. Pat. 2,318,455. J. F. Black, assignor to Circo Products Corp., May 4, 1943. A degreasing apparatus comprising, a drum adapted for the reception of a grease solvent in the lower portion thereof, an electric heater submerged in said solvent in said drum, a thermostatic switch coordinated with said heater and arranged for submersion in the solvent to control a predetermined maximum temperature thereof, a second thermostatic switch coordinated with said heater and arranged for submersion in the solvent to control a predetermined second maximum temperature lower than the first maximum temperature, a third thermostatic switch disposed above the fluid level of the solvent and coordinated with said heater to control the level of the vapor generated in the drum and a manually operated switch in the electrical circuit to the heater between the second and third named thermostatic switches to effect the opening of the circuit to one of said switches and the closure of the circuit to the other of said switches.

Pickling Copper and Alloys

U. S. Pat. 2,318,559. J. O. Percival, assignor to Monsanto Chemical Co., May 4, 1943. An aqueous acid reacting bath for pickling copper or its alloys containing water-soluble ferric ions and organic anions.

Examples:

For Low Brass: Prepickle for 2 minutes in a 10% solution of sulfuric acid at 125° F. Then immerse for 5 minutes at 160° F. in:

Ferric sulfate	9 %
Cream of tartar	0.1%

For High Brass: Prepickle for 2 minutes in a solution of 10% sulfuric acid and 9% ferric sulfate at 140° F. Then immerse for 2 minutes at room temperature in:

Ferric sulfate	9 %
Citric acid	0.5%

For Nickel Silver: Prepickle for 2 minutes in a solution of 10% sulfuric acid and 9% ferric sulfate at 140° F. Then immerse for 4 minutes at room temperature in:

Ferric sulfate	9 %
Adipic acid	0.5%

For Silicon Bronze: Prepickle for 1 minute in a solution of 18% ferric sulfate and 2% hydrofluoric acid at 160° F. Then immerse for 3 minutes at 160° F. in:

Ferric sulfate	9%
Cream of tartar	1%

Barrel Finishing Materials

U. S. Pat. 2,318,578. W. G. Balz and L. R. Davidson, said W. G Balz assignor to Louise M. Balz, May 11, 1943. The method of finishing including the step of tumbling work in a mixture including an abrasive, an emulsifiable oil, and fragments of limestone of widely varying irregular outline and sizes having the sharp point and edges thereof previously removed without destroying the shape thereof, and having substantially smooth surfaces.

SHOP PROBLEMS

PLATING AND FINISHING
POLISHING — BUFFING
CLEANING — PICKLING
HOT DIP FINISHES

METAL FINISHING publishes, each month, a portion of the inquiries answered as a service to subscribers. If any reader disagrees with the answers or knows of better or more information on the problem discussed, the information will be gratefully received and the sender's name will be kept confidential, if desired.

Plating vs. Anodizing

Question: Can you give me some information on anodizing? What I should like to know is, is anodizing plating? Some of the men in my department seem to think that it is. I told them that anodizing is not plating because no metal is put on the stock during anodizing.

I tried to explain that there must be anodes of different metals in any solution such as cadmium, chromium, copper, nickel, silver, zinc, brass, tin, etc., before the process can be called plating. No anodes are used in anodizing; therefore I should not call the process plating.

Some of the boys say that there are several different kinds of plating and that anodizing is one of them because you go through the same procedure in anodizing as you do in the others. What they mean is that you go through the same processes such as cleaning, rinsing, solution of sulfuric acid, water rinse and dichromate.—A. S.

Answer: From a technical standpoint, anodizing is a form of electrodeposition. The difference between it and the usual form of electrodeposition is that the deposition is at the anode instead of at the cathode.

In the anodizing of aluminum, oxygen is deposited at the anode to form a film of aluminum oxide. In various other processes, lead peroxide and molybdenum oxide are deposited at the anode also.

Customarily, however, in discussing the subject of electrodeposition, plating and anodizing are given separate headings.

Cadmium Plating Inside Small Holes

Question: We are experiencing considerable difficulty in cadmium plating parts which have a narrow drill hole about 5/32" in diameter and about 1½" long.—U. S. A. Corp.

Answer: You can cadmium plate inside small holes if you prepare a rack with auxiliary anodes consisting of iron wire which can be centered in the hole and hung in the plating solution. We suggest that you communicate with rack manufacturers who advertise in *Metal Finishing* and advise them of your problem. They will undoubtedly be able to suggest proper types of racks for your purpose.

Anodizing of Aluminum

Question: Please advise where we can get information or circulars on the anodizing of aluminum for airplane parts. We would like to have the formulas for the solutions, both with the chromic acid process and the sulfuric acid process. If we use the sulfuric acid process, we would like to color the material after anodizing to get the yellow-green color of the chrome solution.—F. M. Co.

Answer: The operating details on the chromic acid process will be found in the 1943 edition of the *Plating and Finishing Guidebook*, pages 55-57. Further details are to be found in the booklet entitled "Anodizing Aluminum by the Chromic Acid Process" offered by the Mutual Chemical Company of America.

The coloring of the anodized film produced by the sulfuric acid process is controlled by the Aluminum Company of America. The operation of this solution and the dye baths require rather close control for best results.

Passivating Stainless Steel With HNO_3

Question: Will you please advise us as to the details of the process for passivating stainless steel with nitric acid. We require a tank about 36" x 20" x 20" in size and would like to know what material to use for the tank and heating.

Answer: Stainless steel may be passivated by immersing in a 20% nitric acid solution at 120° F. for 20 minutes. A stainless steel tank may be used if the solution is to be heated by gas. We suggest that a sheet of ¼" or ⅜" boiler plate be placed under the tank in order to spread the heat from the gas burner, as stainless steel is not a good conductor of heat.

If the solution is to be heated with steam or electricity, a stainless steel steam coil or a stainless steel-sheathed electric immersion heater respectively will be suitable. In these cases a stainless steel tank will not be required and a wood or steel tank with a suitable lining such as Tygon, Koroseal or other synthetic materials, will be satisfactory.

Guidebook Formula Questioned

Question: In the 1943 edition of the *Plating and Finishing Guidebook* there is a formula for gold plating about which I should like to inquire. On page 18 appears:

Potassium ferrocyanide	27 oz.
Potassium gold cyanide	4 oz.
Water	1 gal.

Should that be potassium cyanide instead of potassium ferrocyanide? And if it is potassium cyanide, isn't the amount excessive?—H. C. H.

Answer: The formula referred to calls for potassium ferrocyanide and not for potassium cyanide. The potassium gold cyanide which is also given in the formula is soluble in the water and therefore no potassium cyanide is required for the purpose of dissolving the gold salt.

Calculating Plating Costs

Question: I have been subscribing to *Metal Finishing* for a number of years, and have been wondering if you know of a simple way to figure plating jobs such as hard chromium, cadmium, zinc, silver and barrel work. I am getting quite a few government orders, both still and barrel type, and get confused on the price.

I should also like to know the author of a good book on qualitative and quantitative analysis of solutions and one on heat treatment of metals and on alloy composition.—A. A.

Answer: There is no simple method for calculating prices and a great deal of experience is required to do it properly. It is necessary to take into account all the factors which affect the cost of producing the finish, including labor, chemicals, heat, maintenance and overhead.

For procedures on the analysis of plating solutions, we refer you to the 1943 edition of the *Plating and Finishing Guidebook*, a copy of which you should have since you are a subscriber.

In connection with books on the heat treating of metals and the composition of various alloys, we suggest that you visit your local library and examine their books on these subjects to help you decide which ones you wish to purchase.

Information Requested

An inquirer requests information on materials known as "Nasat" and "Supersat" which are used for treating aluminum coatings. If any of our readers are familiar with these materials or can furnish the names of suppliers, we would be pleased to hear from them.

Dictionary of Metal Finishing Chemicals

Ethyl Acetate: $CH_3COOC_2H_5$. Mol. wt. 88.10. Sp. gr. 0.901. M. P. —83.6°C. B. P. 77.2°C. Colorless, inflammable liquid with fragrant od . Also known as Acetic Ester, Acetic Ether, Ethyl Ethanoate. Solubility, 8.6 at 20°C. and 7.4 at 35°C. Infinitely soluble in alcohol, ether, chloroform. Grades: Technical, U. S. P., C. P. Containers: Bottles (1, 5 lb.); Drums (1, 5, 10, 50, 100 gal.); Tank Cars.

Ethyl Alcohol: C_2H_5OH. Mol. wt. 46.07. Sp. gr. 0.7893. M. P. —117.3°C. B. P. 78.4°C. Colorless liquid with vinous odor. Also known as Ethanol, Spirits of Wine, Alcohol, Methyl Carbinol, Grain Alcohol, Ethyl Hydroxide, Ethylic Alcohol. Volatile. Infinitely soluble in water, ether, chloroform, methyl alcohol. Grades: Technical, U. S. P. Containers: Bottles (1, 5 lb.); Cans (1 pint, 1 qt., 1, 2, 5 gal.); Drums (55 gal.).

Ethyl Ethanoate: See Ethyl Acetate.

Ethyl Ether: See Ether.

Ethyl Hydroxide: See Ethyl Alcohol.

Ethylic Ether: See Ether.

Ethylic Acetate: See Ethyl Acetate.

Ethylic Alcohol: See Ethyl Alcohol.

Ethyl Oxide: See Ether.

Exolon: Brand of Silicon Carbide abrasive.

Fatty Acids: See Oleic, Palmitic and Stearic Acid.

Ferric Acetate: $Fe(C_2H_3O_2)_3$. Mol. wt. 232.98. Reddish brown scales. Also known as Iron Acetate. Soluble in water and alcohol. Grades: Technical, Sol'n 11°Bé. Containers: Bottles (1, 5 lb.); Kegs, Carboys—solution (110 lb.); Barrels—solution (450 lb.).

Ferric Acetate, Basic: $FeOH(C_2H_3O_2)_2$. Mol. wt. 190.95. Brownish red powder. Also known as Basic Iron Acetate. Insoluble in water. Soluble in acids. Grades: Technical. Containers: Bottles (1, 5 lb.); Barrels.

Ferric Alum: See Ferric Ammonium Sulfate.

Ferric Ammonium Alum: See Ferric Ammonium Sulfate.

This is the eighth consecutive installment of the alphabetical listing of chemicals used in electroplating. When the series has run its course, a complete dictionary of chemicals used in the industry will have appeared.

Ferric Ammonium Citrate: Brown powder or green or brown scales or pearls. Also known as Iron Ammonium Citrate, Ammonioferric Citrate. Grades: Technical, U. S. P. Containers: Bottles (1, 5 lb.); Cans (5 lb.); Tins (50 lb.).

Ferric Ammonium Oxalate: $Fe(NH_4)_3(C_2O_4)_3 \cdot 3H_2O$. Mol. wt. 428.08. Green crystals and granules. Also known as Iron Ammonium Oxalate. Soluble in water. Grades: Technical, C. P. Containers: Bottles (1, 5 lb.); Cans (1, 5, 10, 25, 50 lb.); Drums (100, 250, 300 lb.).

Ferric Ammonium Sulfate: $Fe_2(SO_4)_3 \cdot (NH_4)_2SO_4 \cdot 24H_2O$. Mol. wt. 964.32. Sp. gr. 1.71. M. P. 230°C, losing water of crystallization. Lilac or violet efflorescent crystals. Also known as Ferric Alum, Ferric Ammonium Alum, Iron Ammonium Sulfate. Solubility, 124 at 25°C. and 400 at 100°C. Soluble in dilute acids. Grades: Technical, U. S. P., C. P. Containers: Bottles (1, 5, 25 lb.); Jars (25 lb.); Kegs (110 lb.); Barrels (240 lb.).

Ferric Chloride: $FeCl_3 \cdot 6H_2O$. Mol. wt. 270.32. M. P. 37°C. Brownish, yellow, very deliquescent, crystalline lumps. Also brownish red solution. Also known as Iron Chloride, Iron Sesquichloride, Iron Perchloride, Flores Martis, Ferric Trichloride. Solubility, 92 at 20°C. Infinitely soluble in hot water. Soluble in alcohol and ether. Grades: Technical—lumps and liquid. U. S. P.—lumps; C. P. —lumps. Containers: Bottles (1, 5 lb.); Crocks (25, 50 lb.); Boxes, Jars (25 lb.); Kegs (100 lb.); Drums (100, 500 lb.); Barrels (200, 300, 475, 500, 600 lb.). Solution, 42°, 48°: Bottles 1 lb.); Jugs (1 gal.); Demijohns (25, 50 lb.); Carboys (125-150 lb.).

Ferric Citrate: $FeC_6H_5O_7 \cdot 3H_2O$. Mol. wt. 299.00. Reddish brown scales, pearls and powder. Also known as Iron Citrate. Soluble in water and alcohol. Grades: Technical, U. S. P. Containers: Bottles, Cartons (1, 5 lb.); Cans (1, 5, 25 lb.).

Ferric Ferroso Oxide: See Ferric Oxide, Black.

Ferric Hydrate: See Ferric Hydroxide.

Ferric Hydroxide: $Fe(OH)_3$. Mol. wt. 106.87. Sp. gr. 3.4-3.9. Gelatinous, reddish brown paste which dries to Fe_2O_3 or flocculent reddish precipitate. Also known as Ferric Hydrate, Iron Hydroxide, Hydrated Ferric Sesquioxide, Hydrated Iron Sesquioxide, Iron Hydrate, Hydrated Iron Oxide, Hydrous Iron Peroxide. Loses water when heated. Insoluble in water. Soluble in acids. Grades: Technical, C. P. Containers: Bottles (1, 5 lb.); Barrels.

Ferric Nitrate: $Fe(NO_3)_3 \cdot 9H_2O$. Mol. wt. 404.02. Colorless to pale violet monoclinic, deliquescent crystals, and 45-47°Bé solution. Also known as Iron Nitrate. Decomposes when heated. Solubility, 71 at 0°C. and 166 at 60°C. Grades: Technical, C. P. Containers: Bottles (1, 5 lb.); Carboys—solution (140 lb.).

Ferric Oxide, Black: Fe_3O_4 or $FeO \cdot Fe_2O_3$. Mol. wt. 231.55. Sp. gr. 5.18. Cubic, black crystals and reddish black powder. Also known as Magnetite, Ferric Ferroso Oxide, Magnetic Iron Oxide, Black Rouge, Iron Ethiops. Decomposes when heated. Insoluble in water. Slightly soluble in acids. Grades: Technical. Containers: Bottles, Cartons (1, 5 lb.); Cans (5, 10, 25 lb.); Wooden Kegs (100 lb.); Barrels (500 lb.).

Ferric Oxide, Brown: A mixture of Red Ferric Oxide, Ferric Carbonate and Ferric Hydroxide in variable proportions. Brown powder. Also known as Iron Subcarbonate and Precipitated Iron Carbonate. Grades: Technical. Containers: Bottles, Cartons (1, 5 lb.); Drums, Tins (25, 50 lb.); Barrels (100 lb.).

Ferric Oxide, Red: Fe_2O_3. Mol. wt. 159.70. Sp. gr. 5.24. M. P. 1565°C. Reddish brown to black lumps or powder. Also known as Hematite, Iron Oxide, Red Rouge, Red Iron Trioxide, Iron Sesquioxide, Red Oxide, Purple Oxide, Crocus, Polishing Crocus, Redstone, Crocus Martis Adstringens, Ferric Trioxide. Insoluble in water. Soluble in acids. Grades: Technical, C. P. Containers: Bottles, Cans, Cartons (1, 5 lb.); Tins (25 lb.); Kegs, Drums (100 lb.); Barrels (300, 350, 450, 500, 550 lb.); Casks (800 lb.).

Abbreviations: Mol. Wt. = Molecular Weight; Sp. gr. = Specific Gravity; M. P. = Melting Point; B. P. = Boiling Point; Solubility figures, where given, are parts by weight in 100 parts of water; Technical = Grade usually used for industrial purposes; Purified or Pure = Better grade than Technical; U. S. P. = Conforms to standards of U. S. Pharmacopoeia; C. P. = Chemically pure, exceeding requirements of the U. S. P.; N. F. = Meets requirements of the National Formulary.

Ferric Oxide, Hydrated: See Ferric Hydroxide.

Ferric Oxide, Magnetic: See Ferric Oxide, Black.

Ferric Oxide, Yellow: Impure ferric oxide found in mineral form and containing silica, alumina, manganese and calcium oxide. Color varies from yellow to brown. Also known as Umber, Sienna. Grades: Technical, according to color and coverage. Containers: Cartons, Tins (1, 5 lb.); Wooden Barrels.

Ferric Perchloride: See Ferric Chloride.

Ferric Peroxide, Hydrous: See Ferric Hydroxide.

Ferric Persulfate: See Ferric Sulfate, Basic.

Ferric Phosphate: $FePO_4 \cdot 4H_2O$. Mol. wt. 222.89. Sp. gr. 2.87. Yellowish, white powder, scales and pearls. Also known as Iron Phosphate. Decomposes when heated. Very slightly soluble in water. Soluble in hydrochloric and sulfuric acids. Grades: Technical, C. P. Also N. F.—soluble scales. Containers: Bottles (1 lb.); Boxes (5, 25 lb.); Kegs (100 lb.); Barrels (175 lb.); Scales in cans (1, 5, 10, 25, 50 lb.).

Ferric Sesquichloride: See Ferric Chloride.

Ferric Sesquioxide: See Ferric Oxide, Red.

Ferric Sesquioxide, Hydrated: See Ferric Hydroxide.

Ferric Sesquisulfate: See Ferric Sulfate.

Ferric Subsulfate: See Ferric Sulfate, Basic.

Ferric Sulfate: $Fe_2(SO_4)_3 \cdot XH_2O$. Sp. gr. approx. 2.0-2.1. Grayish white, deliquescent powder. Also known as Iron Sulfate, Iron Sesquisulfate, Ferric Sesquisulfate, Ferric Tersulfate, Iron Tersulfate. Decomposes when heated and in hot water. Very soluble in cold water. Grades: Technical, C. P. Containers: Bottles (1, 5 lb.); Drums (100 lb.); Wooden Barrels (350 lb.).

Ferric Sulfate, Anhydrous: $Fe_2(SO_4)_3$. Mol. wt. 399.88. Sp. gr. 3.10. Pale reddish brown or yellowish powder. Decomposes when heated and in hot water. Slightly soluble in cold water. Insoluble in sulfuric acid. Grades: Technical, C. P. Containers: Bottles (1, 5 lb.); Bags (100, 175 lb.); Steel Drums (360 lb.); Wooden Slack Barrels (400, 425 lb.).

Ferric Sulfate, Basic: $Fe_4O(SO_4)_5$. Mol. wt. 719.70. Yellow, hygroscopic powder. Also known as Basic Iron Sulfate, Monsel's Salt, Ferric Subsulfate, Iron Persulfate, Ferric Persulfate. Soluble in water. Grades: Technical, Purified. Containers: Glass Bottles (1, 5 lb.).

Ferric Tersulfate: See Ferric Sulfate.

Ferric Trichloride: See Ferric Chloride.

Ferric Trioxide: See Ferric Oxide, Red.

Ferrisul: Brand of anhydrous Ferric Sulfate.

Ferroso Ferric Oxide: See Ferric Oxide, Black.

Ferrous Ammonium Sulfate: $FeSO_4 \cdot (NH_4)_2SO_4 \cdot 6H_2O$. Mol. wt. 392.15. Sp. gr. 1.86. Monoclinic, light green crystals. Also known as Mohr's Salt, Iron Ammonium Sulfate. Decomposes when heated. Solubility, 27 at 20°C. and 73 at 80°C. Grades: Technical, Purified, C. P. Containers: Bottles (1, 5 lb.); Tins (25 lb.); Kegs (25, 100 lb.).

Ferrous Chloride: $FeCl_2 \cdot 4H_2O$. Mol. wt. 198.83. Sp. gr. 1.93. Monoclinic, deliquescent, pale blue-green crystals. Also known as Iron Chloride, Iron Protochloride, Iron Dichloride, Ferrous Protochloride. Solubility, 160 at 10°C. and 415 at 100°C. Soluble in alcohol. Grades: Technical, C. P. Containers: Bottles (1, 5 lb.); Cartons, Tins (5, 10, 25 lb.); Kegs (100 lb.); Barrels (200 lb.); Drums 500 lb.).

Ferrous Oxalate: $FeC_2O_4 \cdot 2H_2O$. Mol. wt. 179.90. Sp. gr. 2.28. Pale yellow rhombic crystalline powder and scales. Also known as Iron Oxalate. Decomposes when heated. Almost insoluble in water. Soluble in acids. Grades: Technical, Purified, C. P. Containers: Bottles (1, 5 lb.); Boxes, Kegs.

Ferrous Protochloride: See Ferrous Chloride.

Ferrous Protosulfide: See Ferrous Sulfide.

Ferrous Sulfate: $FeSO_4 \cdot 7H_2O$. Mol. wt. 278.02. Sp. gr. 1.90. M. P. 64°C. Monoclinic, bluish green crystals, powder and granules Also known as Iron Sulfate, Copperas, Green Copperas, Green Vitriol, Iron Vitriol, Sal Chalybis. Solubility, 15 at 5°C. and 49 at 50°C. Grades: Technical, U. S. P., C. P. Containers: Bottles, Cartons (1, 5 lb.); Cans (1, 5, 25 lb.); Boxes (25 lb.); Kegs (25, 100 lb.); Drums (100 lb.); Bags (200 lb.); Barrels (300-425 lb.).

Ferrous Sulfate, Anhydrous: $FeSO_4$. Mol. wt. 151.91. Grayish white powder. Also known as Dried Ferrous Sulfate. Grades: Technical, U. S. P., C. P. Containers: Bottles, Cans, Cartons (1, 5 lb.); Kegs, Boxes (25, 100 lb.).

Ferrous Sulfate, Dried: See Ferrous Sulfate, Anhydrous.

Ferrous Sulfate, Exsiccated: Ferrous sulfate which has been heated to remove about six of the water molecules. See Ferrous Sulfate, Anhydrous.

Ferrous Sulfide: FeS. Mol. wt. 87.91. Sp. gr. 4.84. M. P. 1193°C. Dark brown to black metallic powder, lumps, plates, sticks, granules. Also known as Iron Sulfide, Iron Sulfuret, Ferrous Protosulfide, Iron Monosulfide. Insoluble in water. Soluble in acids with evolution of hydrogen sulfide. Grades: Technical. Containers: Bottles (1, 5 lb.); Cartons (1, 5, 10 lb.); Cans (1, 5, 10, 25 lb.); Boxes, Drums (100 lb.); Kegs (500 lb.); Barrels (500, 800-900 lb.); Casks (1,000 lb.).

Flake Lead: See Lead Carbonate, Basic.

Flint: A native form of silica or quartz, q. v.

Flores Martis: See Ferric Chloride.

Florspar: See Fluorspar.

Flowers of Sulfur: See Sulfur.

Flowers of Tin: See Stannic Oxide.

Flowers of Zinc: See Zinc Oxide.

Fluoboric Acid: See Hydrofluoboric Acid.

Fluohydric Acid: See Hydrofluoric Acid.

Fluorite: See Fluorspar.

Fluorspar: A natural form of Calcium Fluoride, q. v. Sp. gr. 3.00-3.25. M. P. 900°C. Also known as Florspar and Fluorite. Grades: Lump, ground, gravel of various silica contents. Containers: Bottles (1, 5 lb.); Cartons (1, 10, 50 lb.); Bags; Barrels; Bulk.

Fluosilicic Acid: See Hydrofluosilicic Acid.

Fool's Gold: See Pyrite.

(To be continued next month)

Abbreviations: Mol. Wt. = Molecular Weight; Sp. gr. = Specific Gravity; M. P. = Melting Point; B. P. = Boiling Point; Solubility figures, where given, are parts by weight in 100 parts of water; Technical = Grade usually used for industrial purposes; Purified or Pure = Better grade than Technical; U. S. P. = Conforms to standards of U. S. Pharmacopoeia; C. P. = Chemically pure, exceeding requirements of the U. S. P.; N. F. = Meets requirements of the National Formulary.

NEW EQUIPMENT AND SUPPLIES

NEW PROCESSES, MATERIALS AND EQUIPMENT FOR THE METAL INDUSTRY

Solvent Cleaner

The Enthone Co., Dept. MF, 442 Elm St., New Haven, Conn., have announced a new solvent cleaner which, it is claimed, emulsifies completely without leaving an oily film.

"Platers Solvent Cleaner," as the material is called, is said to have excellent penetrating action due to low surface tension followed by complete dispersion of the cleaner with the dirt during the rinsing process. The product is recommended for bulk or basket cleaning because of its penetration between work and in crevices where alkaline cleaner solutions are ineffective, and for the cleaning of soft metals such as lead, zinc, aluminum, magnesium and tin without etching or staining.

Dust Collector for Grinding, Sanding, and Spraying Operations

A new, low cost, entirely self-contained, table type dust collector for collecting and storing the dust from one or more flexible shaft grinding, buffing, small band sanding, or metal spraying operations—such as illustrated—is announced by Aget-Detroit Co., Dept. MF, Book Building, Detroit, Mich.

The unit, named "Bench-Kop," employs a standard motor driven Dustkop dust collector mounted as an integral part of the table and connected to a down-draft funnel. It requires no connection with a centralized system, or secondary dust collector, and it is shipped completely assembled, ready for operation.

Designed and built of wood wherever possible, "Bench-Kop" consists essentially of a wood table with a wood grille top, under which is installed a sheet metal funnel, which in turn connects to the intake of the 600 CFM, Model 600 Dustkop dust collector, such as used for exhausting the dust from surface, tool, and disc grinding operations.

A baffle plate immediately under the removable wood grille permits the recovery of any heavy pieces of metal, parts or tools which may be dropped through the grille. This baffle also collects a considerable portion of the heavier dust and dirt. The baffle plate is so arranged that the greater portion of the suction is along the two back sides of the table where the greatest suction is required.

A hand-hole clean-out in the bottom of the vertical piping provides an additional means of collecting dust and dirt before it enters the dust collector itself, thereby reducing frequency of cleaning.

A back guard of sheet metal, extending upward from two sides of the table, forms a barrier for heavy pieces of metal or abrasive thrown off from the grinding operation and also tends to concentrate the suction. This also stops any sprayed metal that

Dust Collector

misses the object being sprayed.

The equipment is of bolted construction and is said to be capable of supporting work weighing 1,000 lb.

With a ¼ h.p., continuous-duty motor, it is available for any 60 cycle current. It drives a multiple blade fan which supplies the down-draft. This sends the dust and dirt-laden air through a series of grids and baffles before receiving its final cleaning in the spun glass material of the drum-type filter. The cleaned air is returned to the working space, thereby saving heat. A hand-operated shaker on the top of the drum-type filter permits periodic "shake down" of the filter.

The dimensions of the equipment as illustrated are: floor space 35" x 35"; height to top of the grille working level, 37 inches; height of back stop 24 inches; overall height 61 inches.

Blackening Process

The Tobler Chemical Co., Dept. MF, Portland, Conn., have announced their development of a new, black oxidizing process for iron and steel parts. The process is tradenamed "Blaxite" and its uniform, smooth black finish (either dull or high gloss) is said to offer good resistance to rust. It is operated quickly and economically at a low temperature.

The company offers to treat samples upon request.

Lead Plating of Small Parts

Small metal parts such as springs, bolts, nuts, washers and screws, that were formerly made of brass, copper or other critical materials, are now being made of steel and lead plated to give rust-proof service under the most severe conditions. L. R. Rogers, president of Steel Protection & Chemical Co., Inc., Dept. MF, Mooresville, Ind., conceived the idea of lead plating these small parts, and designed the equipment which is now being used in lead plating millions of such parts for manufacturers of airplane and submarine batteries, engines, and many other types of war equipment.

Mr. Rogers stresses the fact that his treatment is not merely *dipping* the parts in lead, but is an electroplating process in which the parts are given a thorough and uniform coating of the lead to give them complete and lasting protection against rust. He said that the lead-plating process, which made it possible to use steel for these small parts, resulted in the saving of many tons of the critical metals.

In addition to the lead-plating work which the company is doing, it is also mantaining production on its regular line of coal tar protective coatings for pipe lines, tanks, stacks, steel buildings, etc.

Professional Directory

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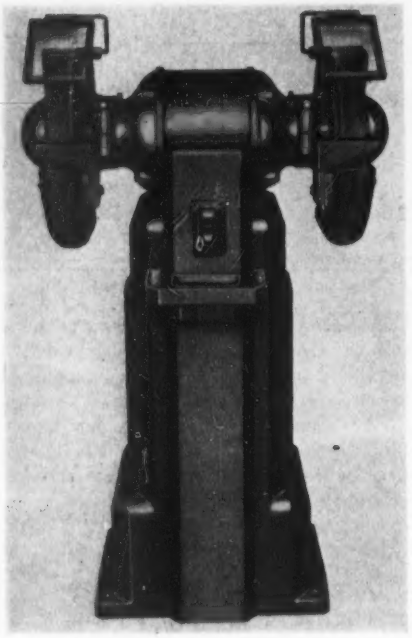


Tool Room Pedestal Grinder

The new unit pictured above has been recently announced by The Lima Electric Motor Co., Dept. MF, 2010 Findlay Road, Lima, O. It is designed as a two or three h.p. unit, 1,800 r.p.m., two or three phase, a.c., 220, 440 or 550 volts.

Two models are available. Model 24S has a distance of 20¼" between the wheels, while model 25S has a 24" distance. On both models, the wheel size is 12 by 2", the wheel arbor diameter is 1¼", the height to the arbor is 39" and the overall height is 45¾".

The totally enclosed motor has a push button control with overload protection, heavy duty ball bearings, improved safety wheel guards, an adjustable tool rest and a combination lift out water pot and tool tray. The wheel guards are equipped with exhaust vents.

Also included in the company's line is the RS drip proof induction motor built in sizes from ½ to 75 h.p.

Remover of Protective Coatings

A new material has been introduced by Michigan Chrome and Chemical Co., Dept. MF, 6348 East Jefferson Ave., Detroit 1, Mich., for the removal of protective coatings manufactured by the company.

This material, known as Miccrostrip, is said to be especially useful for the removal of lacquer used to mask parts for hard chrome plating or for selective hardening. Former methods of removal required the use of a knife or wire brush—tedious processes which also proved damaging to finishes or the parts. It is claimed that within a very few minutes, this new product makes possible quick and easy removal of every trace of lacquer—even that which might have accumulated in small inside diameters or other hard-to-reach spots. The material contains no acids, and therefore will not affect any metal finish. It is also said to be non-toxic.

The product is a combination of solvents and is used as a remover. It is not a thinner. In addition to its use for masked parts, it is recommended for the removal of other Miccro coatings such as those used for the protection of plating racks.

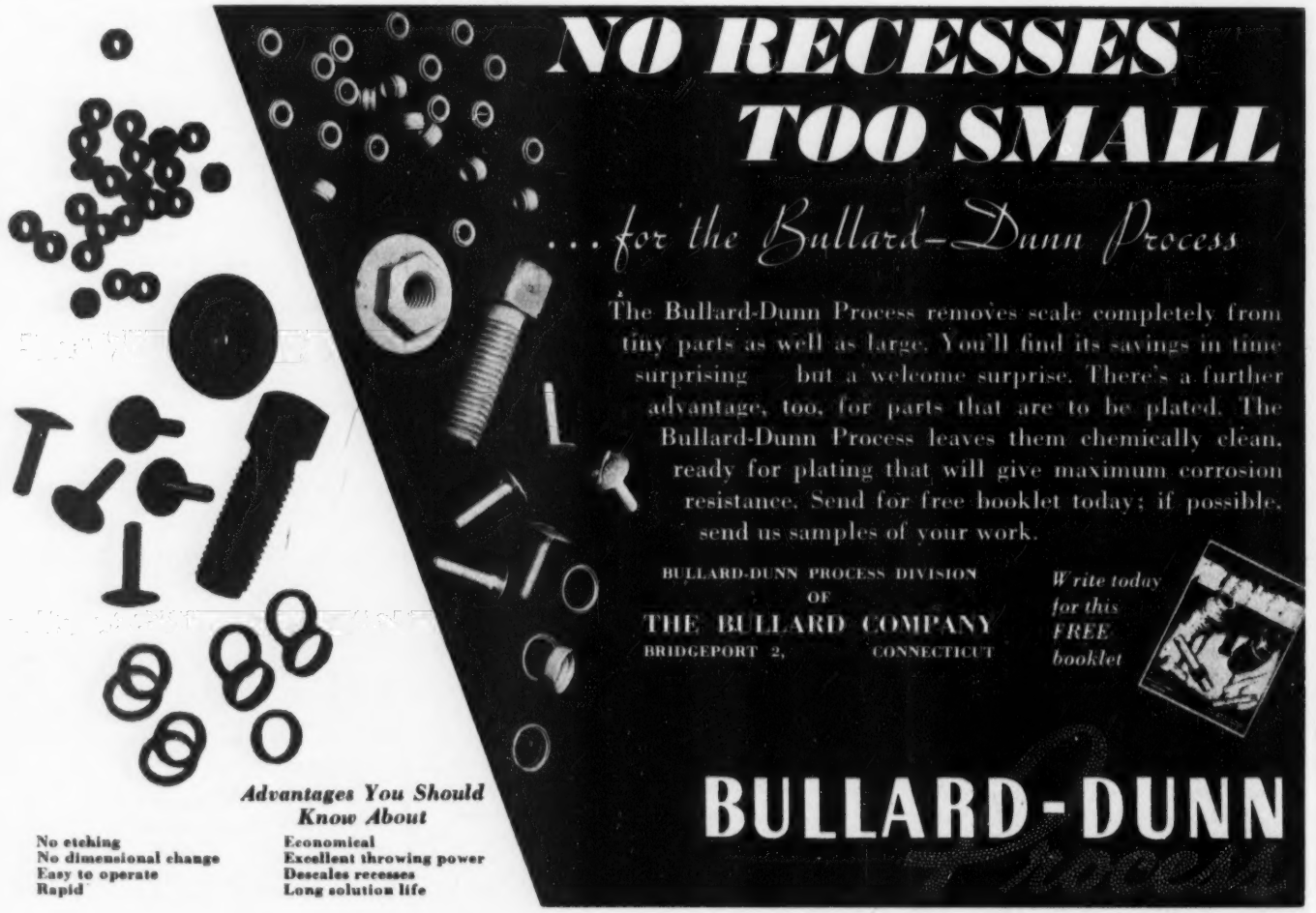
New Pickling Machine

Designed to meet the need for increased production of shells, a continuous, drum-type pickling machine has been developed for high-speed cleaning of shell cases, according to the Howard Engineering & Manufacturing Co., Dept. MF, 1852 Freeman Ave., Cincinnati, O.

Actual operations are said to reveal the machine as capable of pickling a maximum of 8,000 37 mm shell cases per hour. Parts to be cleaned travel through the machine in a drum which varies in diameter between sections, so that each section of the drum runs in its particular tank. Scale is removed from annealed parts by successive pickling, rinsing, neutralizing and rinsing operations. A variable speed drive provides for necessary changes in the pickling time.

The equipment operates without the use of pumps. Acid, rinse and neutralizing solutions are picked up by scoops on the side of the drum, and are dumped by the scoops on the parts.

A typical machine is 35 ft. long, 8 ft. wide and 9 ft. high. To withstand acid corrosion, the pickling and first rinse drums are made of Monel metal and the tanks are lead-lined. This machine is available in special sizes and can be adapted to the pickling of parts other than shell cases.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BECKMAN pH NOTES

BETTER PLATING THROUGH pH CONTROL

NO. 3 OF A SERIES

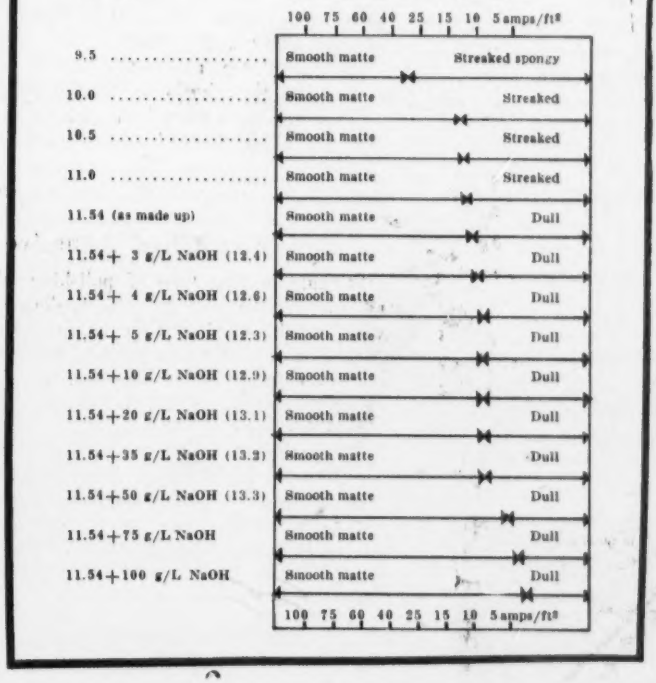
Showing how pH affects plating of brass, cadmium, zinc, copper and similar metals.

How to get better finish, fewer rejects on copper plating work!

COPPER PLATING
Rochelle Copper
(Graham Formulation)

Composition	Oz./Gal.
Copper Cyanide	3.5
Sodium	4.6
Rochelle Salt	8.0
Sodium Carbonate	4.0

Temperature: 160°—175° F.
Hull Cell Plating Time: 8 min.
Hull Cell Current: 3 amps.
(without agitation)



A RECENT electro-plating report states that in cyanide copper plating baths the maintenance of a definite pH value by caustic additions offers many advantages "provided such additions are properly controlled."

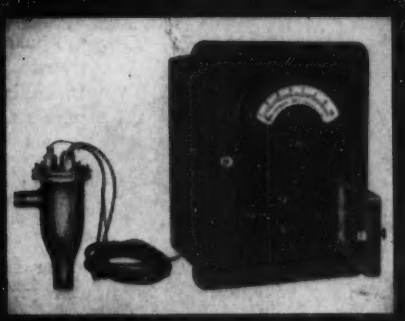
Beckman pH Equipment now makes this control practical and convenient. Beckman equipment permits *for the first time* the accuracy and speed of modern glass electrode pH control to be applied to highly alkaline plating solutions, *even in the presence of sodium ions* . . . a development of vital importance to *all* brass, cadmium, copper, zinc and similar cyanide plating operations!

Note in the copper plating chart at left how the quality of the finish depends upon the relationship of the pH to the current density. A smooth, matte finish is produced over a wide current density range only in the high pH regions. But it is not sufficient simply to keep the bath "highly alkaline". For, although the cathode efficiency increases with increasing pH, the anode efficiency drops off sharply at values above 13.3 pH.

Therefore, maximum copper plating efficiencies demand precise and accurate pH control *within a comparatively narrow range*—the type of accurate control obtainable only with Beckman High pH Equipment!

* Gray-Proc. Amer. Electroplaters Society.

Why risk costly "rejects" when you can insure uniformity of your platings with modern Beckman pH Control—*the only glass electrode equipment that will accurately measure pH in high-alkaline cyanide plating baths.* Send for helpful literature! BECKMAN INSTRUMENTS DIVISION, National Technical Laboratories, South Pasadena, California.



THE BECKMAN AUTOMATIC pH INDICATOR is the most advanced pH instrument available for large-scale plating operations. Automatically indicates, records, and controls. *Ask for Bulletin 16!*

THE BECKMAN INDUSTRIAL pH METER is ideal for portable plant and field use in the electro-plating plant. Highly accurate, simple to operate, ruggedly built. *Ask for Bulletin 21!*

★ In your finishing operations, be they metal, wood, plastic or what-have-you, you can erect tiny monuments to wasted man hours and lost material because of rejects. Or you can maintain a finishing schedule with a plus of increased production, better finish and lower operating costs.

It's up to you.

More and more prime and sub-contracting manufacturers are finding the answers to their finishing problems in McAleer *Quality-Controlled* Materials and Methods. You would be wise to put your toughest finishing problem up to McAleer where 18 years of successful, industry-wide experience would be concentrated in answering your specific finishing problem . . . whether that problem means minimizing rejects for increased production and better finish or lowering operating costs, or both. Whatever it is, let us demonstrate McAleer service on your toughest finishing problem. That's all we ask. As to results, you be the sole judge.

McAleer MANUFACTURING CO.
Quality-Controlled Finishing Materials
ROCHESTER, MICHIGAN

Tank Lining

Paramount Rubber Co., Dept. MF, 10401 Northlawn Ave., Detroit, Mich., have announced their development of a material to substitute for rubber as a lining for acid and chemical tanks which are to be used for passivating, pickling, plating and anodizing solutions.

"Paramount Seamless Plastic," as the material is called, has a resin base and is formulated from non-critical materials. It has a melting point of between 550 and 600° F. and can be applied only in the supplier's plant inasmuch as it requires specialized equipment for its application.

One-half inch thickness is applied for most solutions. However, an inch is recommended for nitric acid passivating.

The following is a list of materials and conditions under which the substance has been tested and is being used, according to the manufacturer:

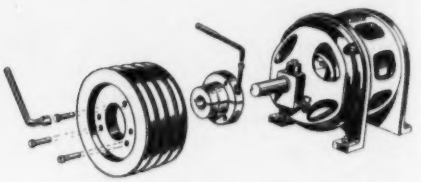
Hydrochloric acid up to 160° F.
Hydrofluoric acid up to 120° F.
50% sulfuric acid up to 160° F.
50% nitric acid up to 80° F.
20% nitric acid up to 140° F.
Most saturated salt solutions up to 220° F.
Most alkali solutions up to 160° F.
Plating solutions of brass, copper, cadmium, lead, tin, nickel, silver and zinc up to 160° F.

New Sheaves for Multiple V-Belt Drives

Pyott Foundry & Machine Co., Dept. MF, 328 N. Sangamon St., Chicago, Ill., are offering a new line of QD (Quick Detachable) sheaves for multiple V-belt drives.

These sheaves are unique in that they can be attached and removed using only a socket wrench as shown below.

A bulletin describing this new line is available upon request from the company.



Carboy Truck

Industrial Products Co., Dept. MF, 2820 N. Fourth St., Philadelphia 33, Pa., have announced a new truck designed to handle carboys easily and safely.

Its shafts are adjustable for any size carboy and the wheels are 24" in diameter so they are large enough to carry the load over rough floors.

Polishing Wheel Adhesive

Stickum, a new type of polishing wheel adhesive unlike glue or cement, does away with cooking and mixing operations and enables more continuous grinding and polishing with fewer wheel changes, according to the manufacturers, W. H. Long Co., Dept. MF, 425 Clark St., Chicago, Ill.

The product is said to set up a more flexible grinding surface than either cement or glue, to resist friction heat and to wear uniformly to the last grain. A further advantage claimed for it is that it does not chunk out.

Eye Mask

Standard Safety Equipment Co., Dept. MF, 232 West Ontario St., Chicago, Ill., have announced the new, all-plastic eye mask, illustrated at left, which is said to have excellent impact resistance, to be non-inflammable, and easily sterilized.

The unit, weighing less than 2 oz., is designed for correct facial contour fit and is deep enough to be worn over prescription lenses.

Manufacturers' Literature

Data Lists on Bronze Bearings

Keystone Carbon Co., Dept. MF, Saint Marys, Pa., have released lists containing pertinent information on Selflube Porous Bronze Bearings carried in stock and available for immediate delivery. An up-to-date stock list will be issued every six to eight weeks. These lists include data on available quantities, sizes, and also code numbers of the bearings which are of porous bronze, moulded to size and oiled. The bearings are ready for installation as received, and are so designed as to eliminate a reaming operation. Maintained tolerances are —.001″ on I. D. and O. D. for each inch; ±.005 on length per inch. Names will be placed on the mailing list by request for data sheets.

Bulletin on Steel Belt Lacing

The Bristol Co., Dept. MF, Mill Supply Division, Waterbury, Conn., have just published a four-page folder covering their line of steel belt lacing. The Bulletin, No. 773, gives prices, sizes, and descriptive information covering this widely used product.

Cylindrical Finishing Machine Bulletin

A new bulletin, No. 502, illustrating Hammond cylindrical grinding, polishing and buffing machines is announced by *Hammond Machinery Builders, Inc.*, Dept. MF, 1601 Douglas Ave., Kalamazoo 54F, Mich. It gives complete detailed information for faster, better finishing of ¼″ to 9″ outside diameter tubes, rods, bars and a wide variety of cylindrical shapes.

The bulletin describes and features the relatively standard unit which can be adapted either for use with grinding, polishing and buffing wheels, or arranged for contact-wheel and abrasive belts with the company's new backstand-idler. This flexibility in arrangement for various grinding, polishing or buffing operations is fully disclosed. A copy of the bulletin may be obtained on request, without obligation.

Cooling Controls

Sarco Co., Inc., Dept. MF, 475 Fifth Ave., New York 17, N. Y., have issued a twelve page bulletin (No. 700) on their cooling controls, covering self-operated temperature regulators and mixing valves to control cooling circuits on internal combustion engines, compressors, condensers, degreasers, stills, etc. The bulletin is illustrated and includes many typical hook-ups; also capacity tables, prices, etc.

War Uses of Heavy Duty Containers

A new issue of the "General Box" is now being distributed by the *General Box Co.*, Dept. MF, Chicago, Ill. With interesting photographs, this issue tells the story of the company's Heavy Duty Boxes—new wirebound containers that have come into use since the beginning of the war.

Designed to combat the hazards of overseas transit, the new boxes represent an advancement in export shipping containers. The booklet points out these boxes are not constructed of veneer as are the majority of wirebounds used in domestic shipping. They are made of ⅜″ resawn hardwood lumber, specially selected for strength to meet rigid specifications. In addition to this natural strength, the boxes are wire-stitched.

In 16 pages this issue covers the shipment of a few of the vital war products which travel to the fighting fronts. Shippers of war products will find it interesting, with plenty of shipping hints on how to pack vital products to be sure they arrive in perfect condition.

War-Packing Practices

No. 10, a 12-page issue of Acme Progress News, features various uses of steel strapping employed outside of the usual peacetime applications. Holding bullet sealing materials to airplane fuel tanks, strapping anti-aircraft shell tubes, parachute flare parts, army cots, compressing bales of wool to meet minimum freight requirements and "packing" oil pipeline for North Africa, are a few of the illustrations and descriptions given.

Copies are available without charge from *Acme Steel Co.*, Dept. MF, 2840 Archer Ave., Chicago, Ill.

Stop Off—
for all plated metals

Now available—actually a successful stop off for use in alkaline electro plating solutions.

BUNATOL 608 is new and unusual. It withstands strong alkali and holds on a trimmed edge to prevent creep of the deposited metal.

Outstanding results in alkaline Copper, Zinc, Tin, Cadmium and Silver. Excellent for those tough hard Chrome jobs too.

A quick air drying coating that brushes easily and lays over any irregular surface without bridging. Economical to use because of its remarkable chemical resistance and adhesion.

No. 608 is new and interesting. Why not test this new stop off—just write for sample on your letterhead.

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Oakwood at Clinton Street
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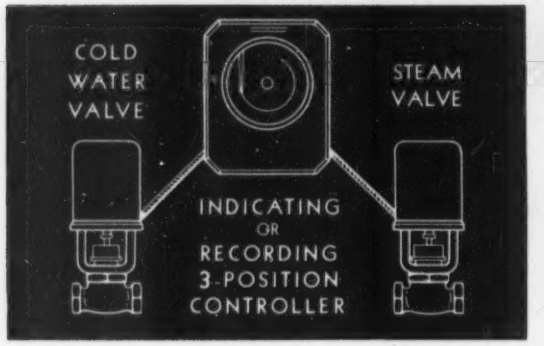
BUNATOL

BARBER-COLMAN CONTROL SYSTEM

FOR MAINTAINING UNIFORM TEMPERATURE OF CHROMIUM PLATING BATHS...



MAXIMUM SERVICE Controls by BARBER-COLMAN COMPANY MINIMUM MAINTENANCE

This automatic control system provides a simple, economical, and dependable means for maintaining the required temperature of chromium plating baths. As the diagram shows, it uses two Barber-Colman two-position electric MOTOR-OPERATED valves governed by a standard 2-position indicating or recording controller. If the bath temperature is low, the steam valve opens; if the temperature gets high, the cold water valve opens; when the bath is exactly right, both valves are closed.

USE MOTOR-OPERATED VALVES FOR BEST RESULTS

Barber-Colman electric *motor-operated* Valves offer a number of advantages on tank control systems. They will provide reliable operation because of positive power-driven seating. Current is consumed only when the valve is changing position, no holding current being required. Motors are available for either low-voltage or high-voltage lines. Construction is of high quality to assure long life and low maintenance. For durable, dependable service, use *Motor-Operated* Valves.

Write for Bulletin "CONTROLS for INDUSTRY"

BARBER-COLMAN COMPANY 1205 ROCK STREET ROCKFORD, ILLINOIS

COLOSSUS* INDUSTRIAL PRODUCTS

COLOSSUS BRAND* WHITE SPANISH

FELT WHEELS AND BOBS

Some part of every airplane, tank, ship, ordnance which come off the production line is polished with FELT WHEELS or BOBS. Polishing with such mediums is like polishing on a cushion . . . a factor that is necessary to the maintenance of precision specifications.

Colossus Brand Felt Wheels and Bobs are produced in Rhodes' mill at Jersey City under the supervision of men who have a thorough understanding of today's polishing and finishing needs. These Wheels and Bobs are made in a full range of diameters, thicknesses, densities to meet your specific requirements.

OTHER PROVEN COLOSSUS BRAND* PRODUCTS

Rhodes' industrial polishing, abrading and cleaning products include—Aluminide (Aluminum Oxide) . . . Dicarbo (Silicon Carbide) . . . Rouges . . . Powdered and Lump Pumice . . . Industrial Felts for all purposes . . . Steel Wool . . . Sponges . . . Chamois.

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New Books

Grinding Wheels and Their Uses. By Johnson Heywood. Second Edition. Published by The Penton Publishing Co., Penton Building, Cleveland, O. 1943. 436 pp.; 6 x 9"; 436 illustrations; indexed; cloth bound. Price: $3.00.

Several additional chapters dealing with such subjects as disk, thread and gear grinding and grinding dies and molds, lapping, honing, superfinishing and the preparation of metallographic specimens, as well as much new material, have been incorporated in this second edition.

Descriptions of the latest methods of grinding have been substituted for older methods because of the improvements made since the treatise originally was written.

Throughout the text considerable stress is laid on typical ingenious kinks for solving various problems. Suggestions also are presented for designing parts to permit their being ground instead of machined by other methods when a better product can be made by grinding, or when production can be increased, or costs decreased.

For convenience, all tabular matter dealing with wheel recommendations for various types of grinding have been grouped together in a separate appendix, followed by lapping compound recommendations and wheel breakage and safety tips.

Many new illustrations have been used to round out the pictorial presentation of shop setups and equipment. Locating the subject matter in each chapter is facilitated by presenting the title of key paragraphs in bold-face type.

The solution of one of the perplexing problems of industrial management, namely, teaching foremen their responsibilities, has been treated in a new text book "Foremanship and Accident Prevention in Industry" published by American Mutual Liability Insurance Company, 142 Berkeley St., Boston, Mass. As the title implies, this 94-page book is designed to teach foremen accident prevention but it is arranged to fit into any foreman's over-all training course.

The book is valuable at this time because the need is great for training a large number of new men placed in the position of foreman and for further schooling foremen of long experience. Because the responsibility of foremen for the control of accidents within their departments has come to be recognized as the key to the success of the plant accident prevention program, the foreman's accident control duties should have a proper place in foremanship training.

While the primary purpose of the book is to give the industrial policyholders of their own company safety engineering service, sample copies are being made available upon request to the executive of any plant engaged in war work, because aid in the prevention of accidents is of outstanding importance to the war effort.

News from California
By FRED A. HERR

With more than 1,500 large and small plants in Southern California engaged in some type or another of work dealing with fabrication, processing or finishing of materials for the U. S. Navy, the personnel of the Naval Inspection Service, 4521 Produce Place, Los Angeles, has expanded enormously during the past year.

Approximately 500 NIS inspectors now work out of the Los Angeles bureau on inspection work dealing with metal finishing, treating and processing, in addition to hundreds of others who handle inspections on other materials. The inspectors average between 6 and 25 inspections a day, the total number of inspections of naval parts sometimes aggregating 4,000 to 5,000 daily in the Los Angeles metropolitan area alone.

The NIS is composed of persons chosen not only for their experience and technical knowledge but also for their discretion, tact and ability to get things done the "Navy way."

In the manufacture of material for the Navy, every related item is inspected which may affect its quality, durability or performance. In the field of metal parts, inspection follows the metal from the foundry to forge, fabrication shop, grinding shop, plating and polishing shop. The plating is tested and checked by former platers who contact the plating shop operators doing Navy work. Even the paint which may be applied to the part prior to shipment must pass rigid requirements.

Acceptance or rejection of naval materials is not based upon personal opinion but upon experienced interpretation of purchase requirements and pertinent specifications. Whenever possible, material offered to the Navy is tested prior to acceptance, either by recognized and approved commercial testing laboratories or the Navy's own laboratories, such as the large one at Mare Island, Calif.

In the laboratory, again, the civilian as well as enlisted personnel represent the highest type of professional chemist, physicist and technician, men qualified to perform any job in the metal finishing and testing field, from preparing a solution to weighing an anodic film.

The samples which are submitted for test to the NIS laboratory or accredited private laboratories are presented by the 500 metal and metal treatment inspectors in the Los Angeles area, and other corps of inspectors at San Diego, San Francisco, etc. Of the 500 inspectors working out of the Los Angeles NIS bureau, some handle special plant inspections on assignments; others have their headquarters in a certain district of the city, with a number of small plants under their jurisdiction; still others are resident inspectors assigned permanently and exclusively to one defense plant in which Navy contracts are being handled.

When a quantity of material or parts is undergoing inspection test, the parts bear the stenciled mark "USN." This identifies it as tentatively being Navy property, not to be diverted and subject to the disposition of the Navy. Only after a material has been proved satisfactory by test is it given the final mark of approval, the anchor stamp. Failure to meet Navy standards is indicated by erasing, blotting or cutting out the "USN" mark.

James P. ApRoberts, former process engineer for *Lockheed Aircraft Co.,* and later a research chemist for *Turco Products, Inc.,* Los Angeles, on July 1 became associated with *Tripplett & Barton,* technical laboratory, 1705 Victory Blvd., Burbank, Calif. His new duties are concerned with process engineering, research into and development of processes and supervision over installation of process plants.

Tripplett & Barton, whose laboratories adjoin the plants of the Lockheed and Vega airplane firms, perform the major part of X-ray analysis of parts and assemblies for Southern California aircraft factories. The firm is widely known, having handled such jobs as the giant parts used at Boulder Dam, and is credited with constructing the first practical portable machine for metallurgical X-ray analysis.

Eason Grinding Co., 1811 East Slauson Ave., Los Angeles, is constructing a $3,500 addition to their machine shop.

Pacific Screw Products Co. is completing a frame addition to their plant at 5211 Southern Ave., Los Angeles, costing $15,000.

RACK COATINGS

Developed To Meet The Requirements Of SPECIFIC PROCESSES

Plating racks used in the usual cycles are subjected to attack by various acids and plating solutions, alkali cleaners and petroleum spirits, depending on the processes required for individual parts. NO SINGLE RACK COATING MATERIAL PROVIDES THE PROTECTIVE QUALITIES NECESSARY TO PROVIDE EFFECTIVE CHEMICAL RESISTANCE THROUGH ALL PROCESSES.

Miccro Products—the largest selling rack coating materials in use today—are available to meet individual needs . . . not only for protective qualities necessary in specific processes but also for the most practical and desirable methods of application. In Miccro-Supreme Stop-Off Lacquers, Miccrolite or Miccroflex you will find the materials exactly suited to your particular requirements. Used singly or in combination as instructed, they will provide the complete protection so necessary for efficient and economical use of your racks.

Miccro Supreme
STOP-OFF LACQUERS
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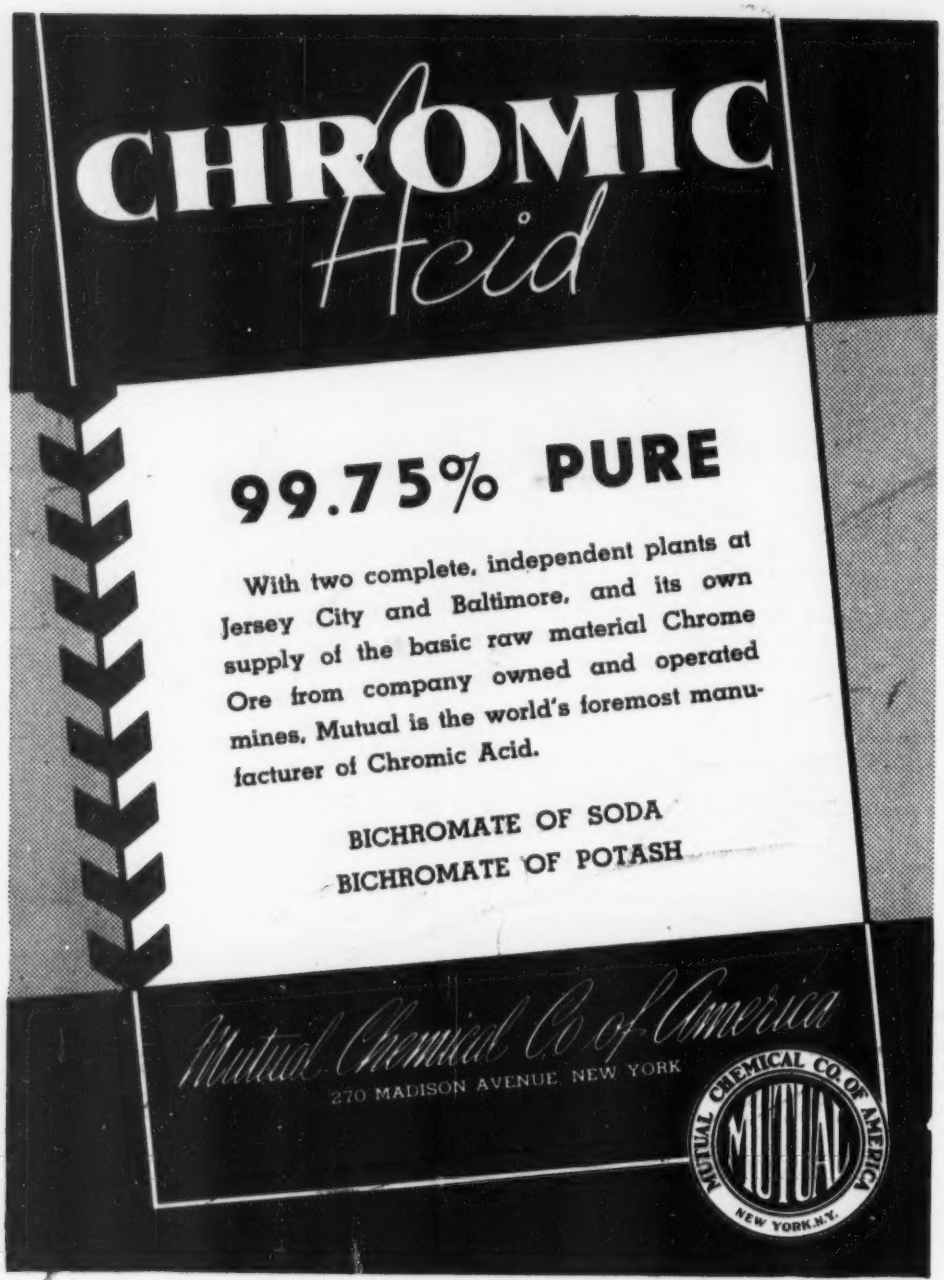
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With two complete, independent plants at Jersey City and Baltimore, and its own supply of the basic raw material Chrome Ore from company owned and operated mines, Mutual is the world's foremost manufacturer of Chromic Acid.
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PLATING RACKS
by JOSEPH NOVITSKY

- We specialize in plating racks of our own patent.
- Constructed without screws, rivets, solder, brazing, welding.
- We design racks to suit your individual problem.

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The National Labor Relations Board has designated the Aeronautical District Lodge No. 2 as bargaining agent of production and maintenance workers of the *Aero Tool Co.*, Burbank, Calif. The union will be the exclusive representative of such employes for collective bargaining with respect to rates of pay, wages, hours of employment and other conditions of employment.

A $10,000 grinding and parts assembly building is being erected by *Aircraft Accessories Corp.*, 166 Olive St., Burbank, Calif.

Menasco Manufacturing Co. is erecting a $10,000 cafeteria building at its Burbank, Calif., plant to provide workers on all shifts with hot meals.

Ernest W. Francis terminated nearly four decades in the plating business—35 years of which were spent in Los Angeles—with the sale on July 12 of his Electro-Plating Shop, 3431 So. Main St., Los Angeles, to *Edward A. Meek* and *Percy G. Dermody* of the *Atlas Plating Co.*

With the disposal of his plant, Mr. Francis plans to retire from active business and devote his time hereafter to looking after his property—and fishing. Friends seeking him in the future will probably find him on the pier at Manhattan Beach, Calif., the city in which he and Mrs. Francis have resided for a number of years.

Mr. Francis' connection with the plating industry dates to 1907 when he began the manufacture of trunk hardware in Detroit, Mich. Early in 1908 he moved to California, establishing the American Plating Co. at 850 So. Santee St., Los Angeles. Somewhat later in the year he formed a partnership with Edward Bathhurst (now deceased) in the Renu Plating Co. Near the close of 1908 he went into business for himself again at 3431 So. Main St., where he was destined to carry on for the next 35 years.

Much of Mr. Francis' work consisted of plating dental equipment, surgical instruments, silverware and similar items. Since shortly after the outbreak of the war, his shop has turned out surgical instruments, with government permission, on a no-priority-until-revoked basis.

Meek and Dermody, the new proprietors, propose to continue the business under the established name, but are revising and expanding the equipment setup to handle a large war contract for aircraft parts which has been awarded them. New equipment being added includes a 2,000 amp. rectifier and a 3,000 amp. generator to augment a 500 amp. generator already on hand from the Francis inventory, and three hard chrome tanks with a total capacity of 4,000 gallons, a 1,000 gallon cadmium tank, and smaller nickel, zinc and copper tanks. The personnel of the shop, which averaged 7 to 8 under Mr. Francis' ownership, is likewise expected to be increased.

The silver and gold plating equipment with which Mr. Francis operated will be retained by Meek and Dermody with the thought of returning to that type of work when the war is over.

Notices of intention of engaging in business under the following firm names have been filed:

Centri-Cast Products Co., Los Angeles, *George Alcalay* and *A. E. Smith.*

Pressure Castings Co., 24800 Narbonne Ave., Lomita, Calif., *M. H. Groom.*

Atlas Lead Co., Los Angeles; capital stock $25,000. Directors, *A. A. Adamson, Harvey Shure* and *J. R. Arkush.*

D and S Sandblast Co., 5012 West Jefferson Ave., Los Angeles, *Orie N. Davis* and *Ernest C. Schuerman.*

Aero Magnetic Laboratories, capital stock $75,000. Directors, *E. C. Plummer, A. B. Reich* and *P. A. Robinson*, all of Los Angeles.

Lynco Pattern and Die Co., 11688 Atlantic Blvd., Lynwood, Calif., *Robert L. Herrington, B. M. Stanford* and *Clinton M. Doubles.*

Pacific Steel Treating Co., 2441 E. Olympic Blvd., Los Angeles, *Bert Wells.*

Kain Fixture & Brass Works, 113 W. Ann St., Los Angeles, *W. R. Stark.*

Salt Lake City, Utah, interests, headed by *Lawrence K.* and *F. B. Requa*, and California parties, including *Herbert Hoover, Jr.*, and *Allan Hoover*, sons of the former president, have formed the *Polar Star Quicksilver Mine Co.*, with headquarters in San Simeon.

Dr. Donald H. McLaughlin, professor of mining and dean of the College of Engineering, University of California, predicts that within little more than a generation the bulk of the world's metal deposits will have been greatly depleted, due to the industrial revolution and more recently to the enormous demands of the war.

The only metals sufficiently abundant in ordinary rocks to supply all possible future needs, according to the savant, are iron, aluminum and magnesium. He stated that all other metals are too scarce to offer any hope of recovery on an industrial scale from ordinary rocks but must be obtained from relatively small deposits where natural concentrations have occurred.

Speaking before the Berkeley, Calif., chapter of Sigma Xi, national honorary scientific society, Prof. McLaughlin said that of these three industrial metals which are found in abundance, only magnesium is now ordinarily recovered from common rock or other large sources, such as ocean brines.

Better Pickling

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ACID ADDITION AGENT

If you do pickling of iron and steel, Enthone Acid Addition Agent is needed by you to:

1. Reduce fuming by forming a light foam on acid surface.
2. Reduce hydrogen evolution by inhibiting action on bare steel.
3. Reduce hydrogen embrittlement.
4. Get a brighter steel.
5. Reduce drag-out by lower surface tension.
6. Pickle smoother and more uniformly.
7. Do better electropickling with Bullard-Dunn process.
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Write for new booklet "Modern Pickling of Iron and Steel" and let us send you a sample of AAA for your tests.

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For fuse elements
ZINC WIRE
THE PLATT BROS. & CO., Waterbury, Conn.

NICKEL SILVER

Sheets — Rolls

Phosphor Bronze, Bronze Gilding Metal
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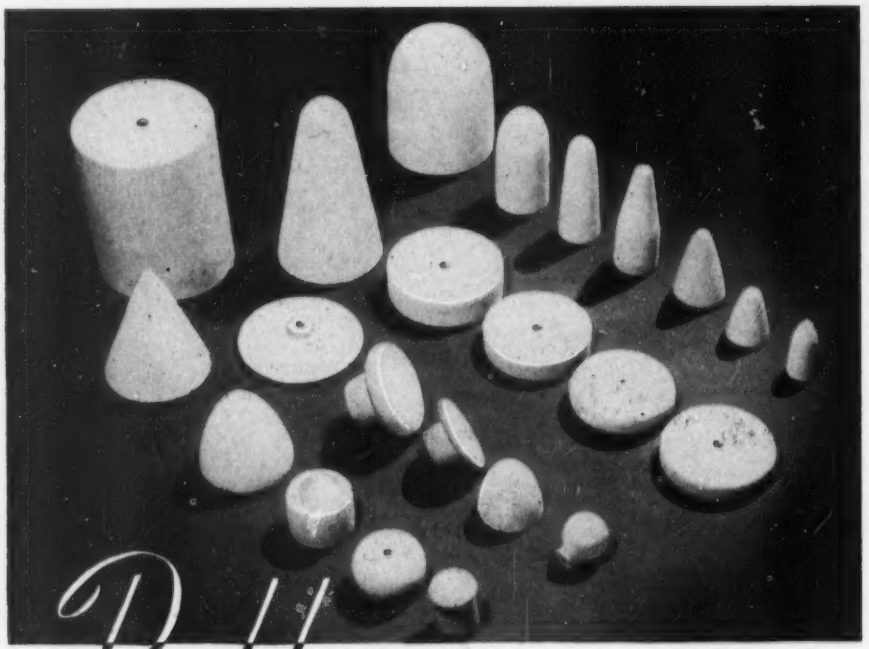
WATERBURY ROLLING MILLS, Inc.
Waterbury, Conn.



Problems...

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Have you a polishing, deburring or finishing problem? Is it one of those hard-to-get-at places? Irregular in shape?

Paramount Brand felt bobs either plain or shaped may be your answer. Why not try them?

We are well equipped to produce any size or shape quickly and economically.

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"America's Oldest Felt Manufacturers"

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Cutting Corners
. . . . for Top Speed Production
Rounding corners or removing burrs by grinding or filing is too slow and costly to meet today's demands for speed and economy.
Barrel finishing has solved many such problems. Write to us about yours and send a few unfinished samples of your small, metal parts. We'll gladly tell you if they're adapted to finishing with Abbott barrels and materials.
The Abbott Ball Company
1046 New Britain Ave. Hartford, Conn.

Aluminum and iron, which constitute 8% and 5% respectively of the igneous rocks of the earth's outer crust, are now only obtained commercially from restricted sources where extremely slow geologic processes have concentrated them into high-grade ore, Prof. McLaughlin said. At present, he amplified, there is no reason to think that the vast tonnage of these two common elements in the unenriched rocks will ever be available for human needs.

Centerless Grinding Co., 761 East Slauson Ave., and *Plumb Tool Co.*, 2043 Santa Ave., Los Angeles, have recently completed factory enlargement programs.

Articles of incorporation have been issued to *Amboy Chemicals Co.*, Los Angeles. Directors are *Leo N. Roach*, Monrovia, Calif.; *Walter H. Hewicker*, Beverly Hills, Calif., and *James E. Sellers*, Alhambra, Calif.

Twenty young men from the company's metal finishing, processing, polishing, shaping and fabrication departments comprise a boxing team which represented *Century Metalcraft Manufacturing Corp.*, Los Angeles, in a Victory boxing tournament sponsored at Hollywood American Legion Stadium by the *Los Angeles Times*, beginning July 14. Prominent members of the company's team were *Chester Jacobs, Sam Dimitri, William Richardson, John Vickers* and *Andy Moster*. The firm engaged *Young Papke*, former professional boxer and son of one-time middleweight champion Billy Papke, to train the team.

The future of magnesium as a structural material is in the research laboratories of the country, where additional research is needed to design alloys of magnesium and find an effective method to check corrosion, *Dr. L. H. Duschak*, professor of metallurgy of the University of California, stated in a recent discussion of metals which will figure prominently in the American industrial picture.

He declared that magnesium will hold a high rank, competing with aluminum in light-weight construction. Magnesium, Prof. Duschak stated, is the lightest of the common metals, having about one-fifth the density of copper and possessing more strength per unit of weight than aluminum and several times that of ordinary steel.

One of the few metals produced from raw materials which are abundantly available, magnesium, according to Prof. Duschak, will be in wide use because it may also be obtained from several common minerals as well as from sea water. One cubic mile of sea water, he declared, contains four to six million tons of this metal.

Pacific Airmotive Co., 6853 Lankershim Blvd., North Hollywood, Calif., is constructing a $10,500 test laboratory building.

The tenth and final unit of the government's $130,000,000 *Basic Magnesium, Inc.*, plant at Las Vegas, Nev., began producing metal early in July, bringing the plant's production to capacity less than two years after the first soil tests were made.

The plant will have an output 3½ times greater than that of all the world's other plants combined. Although the rated capacity is 15 tons per unit each 24-hour period, or 150 tons per day, this output is being exceeded, *F. C. Case*, general manager, disclosed.

The 10th regional War Labor Board on July 1 granted wage increases ranging from 5c to 15c per hour to more than 20,000 employes of Southern California airplane parts manufacturing firms. The increases were established to stabilize wages within the parts industry and prevent migration of labor. The decision does not authorize blanket increases but affects only the employes of 110 firms which applied for permission to grant specified wage increases.

Pacific Chemical Co. suffered damage estimated at $30,000 from fire which broke out July 12 in their plant at 114 College St., Los Angeles, following an explosion. Fed by several thousand gallons of stored chemicals, the fire gutted the two-story building, which was described as a total loss.

Obituaries

Vernon J. Twyning

Vernon J. Twyning, vice president of J. C. Miller Company, Grand Rapids, Mich., died suddenly on Tuesday, June 29th.

Mr. Twyning was born in Bay City, Mich. in 1888. As a youth he moved to Grand Rapids and worked in the Wolverine Brass Company and as a foreman and production superintendent for the National Brass Company.

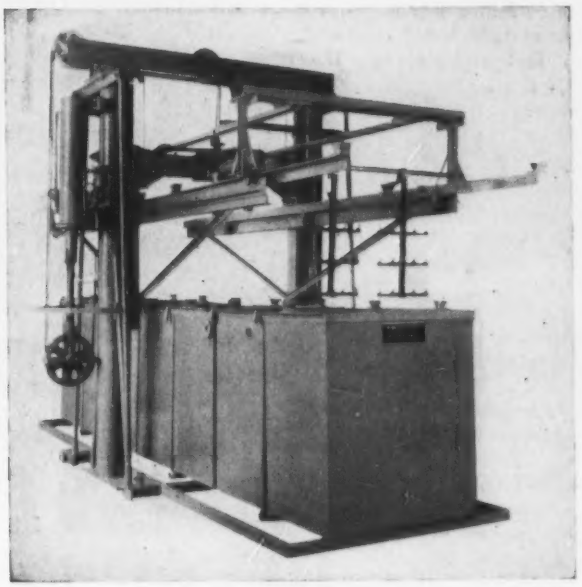
In 1926 he started work in the sales department of the J. C. Miller Company and later became office manager and vice president.

Mr. Twyning was a Mason and was a member of the Peninsular Club and the Lions Club.

Surviving is a son, Robert V. Twyning, a chemical engineering graduate of Michigan University who is now in the Micarta Division of Westinghouse Electric and Manufacturing Co., East Pittsburgh, Pa.

Mrs. Charles Wallace, wife of Charles Wallace, proprietor of the California Electroplating Co., 3436 East Olympic Blvd., East Los Angeles, Calif., died in June at the age of 50. In addition to her husband, she is survived by two adopted children.

Crown Pick-up Unit



...MACHINE...
A UNIT TYPE TRANSFER CAPABLE OF HANDLING SEVERAL TANKS AT ONE TIME.

●

...USE...
FOR A SERIES OF OPERATIONS WHERE THE WORK MUST PASS THROUGH SEVERAL TANKS, AS THE CLEANING AND RINSING OPERATIONS, FOR A SEMI-AUTOMATIC PLATING TANK.

CROWN RHEOSTAT & SUPPLY CO.
1910 MAYPOLE AVENUE :-: :-: CHICAGO, ILLINOIS

BRASS SHEET
Bronze and Gilding
Processed For Difficult Drawing
Bright Finishes
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OXY-DYZ-ENE
HIGHEST STRENGTH
OXIDIZING AGENTS
POSSIBLE TO PRODUCE
Sold in LUMP and LIQUID FORMS by Leading Plater Supply Houses
Manufactured For 66 Years By
KREMBS & COMPANY
669 W. OHIO ST. CHICAGO, U.S.A.

Truly—Three Great Finishes!!
CHROMIUM — UDYLITE — SHERARDIZING
For over a quarter of a century building and installing portable sherardizing furnaces and equipment; metal finishing and plating. We invite your inquiry.
THE NATIONAL SHERARDIZING & MACHINE CO.
Office & Factory Hartford, Conn.
Foreign Representatives—Oliver Bros., Inc., 417 Canal St., N. Y. City

CHROMIUM PLATING
SCREWS-RIVETS-WASHERS
SMALL PARTS, ETC.
THE CHROMIUM PROCESS CO.
Shelton, Conn.

Business Items

In the interest of extending better service and for the purpose of establishing resident contacts with important metal centers, *H. Rudner,* president of *Empire Solvents Corp.,* 170 Broadway, New York, N. Y., announces the appointment of the *Edward F. Berry Co.* The new office is located in Detroit at 6432 Cass Ave.

Edward F. Berry, head of the representing branch, will be in charge of sales and service for Empire Black—a new black oxide finish for steel.

William S. Richardson, general manager of the industrial products sales division, *The B. F. Goodrich Co.,* has been elected chairmen of the OPA Mechanical Rubber Goods Industry Advisory Committee, it is announced from the office of *Prentiss M. Brown,* administrator of OPA.

The committee, which the B. F. Goodrich official will head, is composed of representatives of all rubber companies engaged in the manufacture of mechanical rubber goods totalling many thousand items.

The committee will establish a working relationship between the Office of Price Administration and the industry to stabilize wartime prices, and make recommendations to OPA on new developments.

Richardson has been with B. F. Goodrich since 1926.

James G. Gammel

James G. Gammel, formerly industrial brush representative of *The Osborn Manufacturing Co.* in the New England territory, has been promoted to the position of technical assistant in brush engineering service at Osborn's home office and factory, Cleveland, O.

Since joining the company, Gammel has been particularly active in helping war industries increase production through the application of industrial brushing techniques and methods. In his new post, he will extend his brush engineering activities by assisting Osborn representatives throughout the country in applying recommended power brushing methods to increase output and improve quality in war production.

Gammel will act as assistant to *G. O. Rowland,* Osborn executive, who as chief of WPB's industrial brush unit, is required to spend a portion of his time in Washington.

E. Nuber has been appointed manager of the Pacific Coast branch offices and factory, according to an announcement by *H. E. Beane,* sales manager of *The Bristol Co.,* Waterbury, Conn.

Mr. Nuber studied electrical engineering at Brooklyn Polytechnic Institute. He was associated with the New York Edison Company for six years in their general test and engineering department. He was later associated with the Western Electric Co. as production engineer and also spent several years with the Board of Transportation of New York City.

Mr. Nuber joined The Bristol Co. in 1929 as sales engineer and since then has represented them at their Boston, Akron, Waterbury, Birmingham, Chicago, and Los Angeles offices at various periods during his association with the company. Before being appointed to his new position as Pacific Coast district manager, he was manager of the Akron branch office and factory.

Mr. Nuber will make his headquarters at the company's branch offices at 40 Berry St., San Francisco, Calif.

4A FINISHES

POLISHING COMPOUNDS 4A symbolizes SUPERB PERFORMANCE, which you will find in our compounds for CUTTING, CUT AND COLOR, AND MIRROR FINISHING all kinds of steel including stainless steel, carbon steels and hard-to-buff alloys.

COLORING ROUGES Uniform, carefully graded raw materials, expertly compounded by Harrison's technicians, insure rouges that give high luster and faultless finishes.

4A CEMENT and THINNER Used for setting-up wheels, belts, buffs, rolls—they are free cutting, long lasting and economical when set up with 4A Cement.

SAMPLES ON REQUEST

HARRISON and COMPANY
HAVERHILL, MASS.

LaMOTTE CONTROL EQUIPMENT
for the
ELECTROPLATER and ELECTROTYPER

As an aid in the control of plating baths of
NICKEL, ACID ZINC, TIN, CYANIDE
ACID COPPER, CADMIUM, BRASS and BRONZE

LaMotte Block Comparators
for pH tests to accurately control the acidity and alkalinity of nickel, zinc, tin or cyanide baths. Inexpensive and easy to operate. A test can be made in a few minutes.

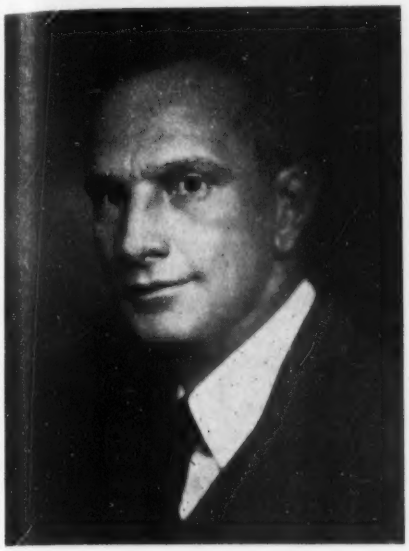
LaMotte Acid-Copper Analytical Set
for accurately determining and regulating the acid and copper content of the bath to insure uniform results.

Other LaMotte Outfits for determining Chlorides, Nickel Content, Iron Content and positive control of Cyanide Copper, Acid Zinc, Cyanide Zinc, Cadmium, Brass and Bronze plating solutions.

Write for further information.

LaMOTTE CHEMICAL PRODUCTS CO.
Originators of the Practical Application of pH Control
DEPT. MF TOWSON, BALTIMORE, MD.

New Mutual Chemical Co. President



George A. Benington

At a meeting held July 1st, the directors of the *Mutual Chemical Co. of America* elected the following officers: *Dr. Herbert M. Kaufmann,* formerly president, was elected Chairman of the Board, and *George A. Benington,* formerly executive vice-president, was elected President.

The Mutual Chemical Co. is the oldest and largest manufacturer of chromium chemicals in the United States. Its finished products are essential to the war effort and are made at its plants in Baltimore and Jersey City. In addition, the company owns or is interested in chrome ore mines in New Caledonia, Canada, and Rhodesia.

CONTROL AND VALVE
FINISH
COLD RINSE
BLACK-MAGIC
HOT RINSE
ALKALI
Black-Magic
"the one bath process"
From cleaning to finished product in five to fifteen minutes.
Any volume. Tanks sized to eight hour production.
Accepted for pliers and nippers. W.P.B. Order L-216, Schedule 3. Other Government contracts requiring Black Oxide finish.
WITCH-DIP
A wax base final finish. Resists rust. Does not rub or dry off.
Black-Magic processes for zinc sheet and die-castings.
Write for portfolio of complete information.
MITCHELL-BRADFORD CHEMICAL CO.
BRIDGEPORT, CONN.

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BUFFING COMPOSITIONS
NICKEL ANODES
CHEMICALS AND GENERAL SUPPLIES

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INSULATED PLATING RACKS
Special and Standard Sizes

For all parts regardless of shape. We specialize in your rack problem.

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ARMITAGE 6766

INDIAN BRAND
POLISHING ABRASIVE

A new type, long wearing, economical abrasive grain. Perfected and introduced by us as a substitute for imported Turkish Emery. Leading defense plants now using large quantities for essential war-work, report excellent results.

Send for trial lot—Free

HAMILTON
EMERY & CORUNDUM COMPANY
Established 1904
Chester Mass.

Established 1901

ORIENTAL ROUGE CO., INC.

66-68 PINE STREET, BRIDGEPORT, CONN.

ALUMINUM: cutting and coloring compounds.
STAINLESS STEEL: a complete line of cutting and coloring compositions.
STERLING and SILVER PLATE: Rouges to fit your particular job.

We invite your inquiry.

VULCAN SODIUM STANNATE

Manufactured by

THE VULCAN DETINNING CO.
SEWAREN, N. J.

Under Patents Nos. 1,575,217 and 1,708,392

FOR TIN ELECTROPLATING

SALES AGENT

The Electrochemicals Dept., E. I. Du Pont de Nemours & Co., Inc., Wilmington, Delaware.

Sam Tour

The metallurgical laboratories that were established by *Sam Tour* during the 14 years he has been vice-president and chemical and metallurgical engineer in charge of the engineering departments of *Lucius Pitkin, Inc.*, now located at 45 Fulton St., are now being operated as the laboratories of Sam Tour & Co., Inc.

Lucius Pitkin, Inc., will continue as before as analysts, assayers, chemists, consultants, spectroscopists, weighers and samplers, and shippers' representatives catering to the mining and metallurgical industries.

The main office and laboratories of Lucius Pitkin, Inc., will continue in the Pitkin Bldg. at 47 Fulton St., New York, N. Y.

Sam Tour & Co., Inc. will take over the work as consultants, engineers, metallurgists, metallographers, radiographers, research development and testing laboratories for the many clients previously served by the discontinued departments of Lucius Pitkin, Inc.

Sam Tour & Co., Inc. with main offices at 65 Pine Street, and laboratories at 45 Fulton Street, New York, will specialize in the metallurgical, chemical and process engineering fields.

Associated with Mr. Tour in his new organization will be the entire staff with which he surrounded himself while building up the Pitkin engineering division. *Dr. E. I. Valyi* is well known as a materials and process engineer of wide experience. He has been identified with numerous projects in structural engineering, machine design and metal fabrication, calling both for pioneering in new methods and improvements in prevailing operations.

Alexander Gobus, formerly metallurgist for The Doehler Die Casting Co. and for The American Car and Foundry Co. and for the past five years chief metallurgist for Lucius Pitkin, Inc., will continue in that capacity for Sam Tour & Co., Inc. Mr. Gobus is an expert in the heat treatment of steel, in metallography and radiography. He has aided in expanding the use of radium in field inspections of castings and weldments.

Mr. Charles Davidoff had been chemical engineer for Lucius Pitkin, Inc., for the past five years and will continue in that capacity for Sam Tour & Co., Inc. Mr. Davidoff has a wide experience in chemical engineering, electroplating, metal finishing and corrosion testing.

Mr. Edmund Silk as chief metallographer and radiographer for Sam Tour & Co., Inc., had been in charge of this work for Lucius Pitkin, Inc. for a number of years.

Mr. B. Mechanic as a chemical engineer for Sam Tour & Co., Inc., had been in charge of a number of projects handled by the metallurgical department of Lucius Pitkin, Inc., during the past several years.

All of the key personnel are identified with the various technical societies devoted to their special fields.

George O. Rowland, an executive of *The Osborn Manufacturing Co.*, 5401 Hamilton Ave., Cleveland, O., producers of power driven brushes for industry, has been appointed chief of the War Production Board's industrial brush unit, Washington, D. C.

Peters-Dalton, Inc. is the new name assumed by Industrial Sheet Metal Works, 628 E. Forest Ave., Detroit 1, Mich., manufacturers of dust collectors, industrial ventilating systems, spray booths, ovens, etc.

The company decided to use the names of their founders, O. A. Peters and A. J. Dalton, to avoid confusion with other firms having names similar to their former one.

Cleaning White Metals the Permag way

Cleaning Aluminum, Zinc, Die-Cast Metals, etc., to keep step with the intense war production effort today means having a cleaning compound that is absolutely dependable and lightning fast in action.

PERMAG Cleaning Compounds

are meeting these heavy demands of industry in the complete removal of grease, oil, dirt, every foreign particle from metal surfaces prior to finishing.

New cleaning problems frequently confront the industry. Our Cooperative Service men and experienced technicians are helping solve these difficulties.

If you have one write or 'phone us. No obligations for interviews.

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Manufacturers of Specialized Scientific Cleaning Compounds

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Nationally Represented. Warehouses in principal cities.
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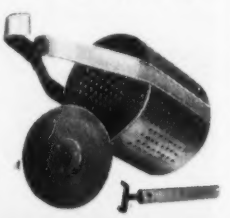
Canadian PERMAG Products, Ltd., Montreal—Toronto

ROLOCK

PROCESSING CARRIERS

with PRESSURE SCREW JACK for ANODIZING CONTACT

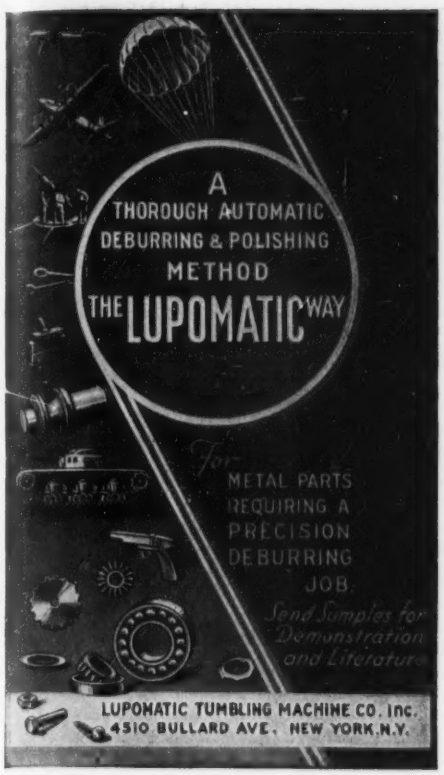
Rolock built this 3 part Rivet Anodizing basket, made to be suspended from a bus bar over the bath. Pressure plate is forced tight by twisting jack which insures good electrical contact. Whatever YOUR problem in metal processing carriers, Rolock will build the correct one for the job.



Write for bulletin and recommendations.

ROLOCK, INC.

1300 Kings Highway East, Fairfield, Conn.



The Mathieson Alkali Works Inc., 10 E. 42nd St., New York, N. Y., announces the appointment of *J. B.* ("*Jun*") *Peake*, formerly New York district sales manager, to the post of assistant general manager of sales. In his new capacity, Mr. Peake will be assistant to *D. W. Drummond*, general manager of sales.

Born on July 25, 1894, in Norfolk, Va., Mr. Peake graduated from Washington and Lee University in 1915, where he was a member of Sigma Nu fraternity. During World War I, he served as First Lieutenant in the Coast Artillery Corps, attached to the 29th Air Squadron as aerial observer. He joined the New York office of Mathieson Alkali Works in 1920, later being transferred to the Charlotte, N. C., district sales office, from which point he opened up the Southwest territory, where Mathieson had not previously been represented. Subsequent posts held by Mr. Blake were district sales manager for the Chicago, Cincinnati and New York territories.

"Pur-Blac"

The Black Oxidized finish that penetrates Iron & Steel Surfaces

ECONOMICAL Inexpensvie equipment with minimum procedure.
CORROSION RESISTANT Will stand a 100 hour salt spray test.
NO CHANGE IN DIMENSIONS Parts remain same size after treatment.
NON-TECHNICAL Temperatures not critical. Analytical control not necessary.
PERFECTLY UNIFORM Beautiful ebony finish maintained throughout.

Write for descriptive folder

THE PURITAN MFG. CO.
Waterbury, Conn.

The Osborn Manufacturing Co., Cleveland, O., announce the promotion of *Dewey C. Harvey* to the post of chief plant engineer. The concern produces industrial brushes and foundry moulding machines.

Prior to joining the Osborn Co. in 1935, Harvey served in the engineering departments of Peerless Motor Co., Bartlett & Snow Co., and The Bender Body Co. Shortly after finishing his schooling in Cleveland, he went overseas as a member of the U. S. Marines during World War I, where he was awarded the Purple Heart medal for conspicuous bravery in action.

As head plant engineer covering both the brush and moulding machine divisions of the Osborn Co., Harvey will have charge of new construction and plant maintenance, including power plant operations, and will also superintend the installation of new machinery at the factory and home office.

Hartford STEEL BALLS

Burnishing and polishing balls and mixtures. Absolutely guaranteed not to wear out through burnishing use.

THE HARTFORD STEEL BALL CO
HARTFORD CONNECTICUT

J. W. Peckham has been appointed manager of the development and design engineering department for *The Bristol Co.*, Waterbury, Conn., manufacturers of automatic control and recording instruments, according to an announcement made by *L. G. Bean*, vice-president in charge of engineering and sales.

Mr. Peckham was graduated in electrical engineering from Rhode Island State College in 1921, after which he joined the radio research department of the General Electric Co. In 1922 he joined the Bristol radio engineering department.

In 1940 he was appointed Pacific Coast district manager in charge of the company's San Francisco, Seattle, and Los Angeles offices and San Francisco branch factory.

Mr. Peckham will make his headquarters at the general offices of the company, Waterbury, Conn.

ROBERTS
BUFFING and BURRING COMPOUNDS ASSURE

The Best Quality, Correct and Uniformly controlled manufacturing, Fair Price Policy, and Special Formulas for Individual Demands.

WE PRODUCE

BURRING COMPOUNDS	All types
ROUGES (Iron Oxides)	(Quick wash) All grades
TRIPOLI	Numerous grades
EMERY PASTE	All size grains
COMPOUNDS	For every metal
GREASE STICKS	For better efficiency
LIME COMPOUNDS	Many formulas

—Let us send you some free samples—

The ROBERTS ROUGE COMPANY
STRATFORD CONNECTICUT

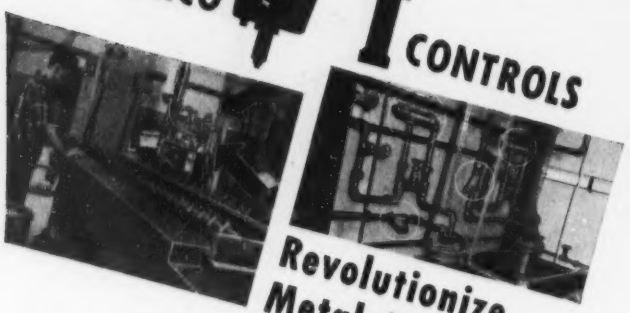
FOR
HARD CHROMIUM
USE
ZIALITE ADDITION AGENTS
to obtain

1. Finer grain structure
2. More durable plate
3. Smoother heavy plate
4. Greater throwing power
5. Less sensitivity to sulphate ratio.

Send a sample of your present bath to see if it is suitable for conversion to this improved formula.

ZIALITE CORPORATION
143 Exchange Street
Worcester, Mass.

SARCO LSI No. 87 CONTROLS



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No longer need plating, degreasing, washing or other processing in metal finishing plants depend on rule o' thumb!

Neither is it necessary any longer to make heavy investments for intricate control equipment, difficult to keep in day-by-day operation.

Sarco has demonstrated in hundreds of plating plants that very simple, inexpensive controls can do the work — when correctly selected and applied.

Three distinct types are available, tailored to the job and ranging from combination trap controls for small tanks, to electric control for chromium plating, where temperatures are held within 1°F. Ask for the bulletins on Sarco Steam Traps and Control for metal plating and finishing.

159

SARCO SAVES STEAM

SARCO COMPANY, INC.
475 Fifth Avenue, New York, N. Y.
Sarco Canada Ltd., Federal Bldg., Toronto, Ont.

PRECISELY ENGINEERED TO DO A *SPECIFIC* SPRAYING JOB

Spraying Systems nozzles embody knowledge and experience gained in 18 years of nozzle design and manufacture.

Suppose you need a particular type of nozzle to spray 11.6 GPM of water at 20 lbs. pressure in a full cone spray pattern. Among the thousands of nozzles available, there is one that meets exactly these specifications.

Write today — lay your spray problems before experts who have already come up with thousands of time and money-saving solutions. There's no charge for our engineers' advice.

SPRAYING SYSTEMS COMPANY
4039 W. Lake Street, Chicago, Illinois

SPECIALISTS IN THE DESIGN AND MANUFACTURE OF SPRAY NOZZLES

FOR QUALITY!

99%+ PURE

NICHOLS
TRADE MARK TRIANGLE BRAND U. S. PAT. OFF

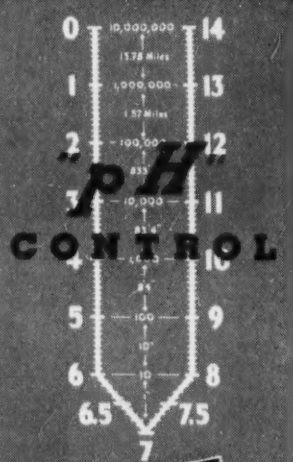
COPPER SULPHATE

THE STANDARD FOR OVER 50 YEARS

NICKEL SULPHATE
COPPER OXIDE (RED)

PHELPS DODGE REFINING CORPORATION
ELECTROLYTIC REFINERS OF COPPER
40 WALL STREET, NEW YORK, N. Y. • 230 N. MICHIGAN AVE., CHICAGO, ILL.

KELITE
SCIENTIFIC CLEANING THROUGH pH CONTROL



pH Control is the new method which has replaced guesswork with science in the manufacture and dispensing of industrial cleaning materials—provides the key to scientific cleaning

KELITE KENIZE Expedites Galvanizing

Kelite Kenize has been developed specifically to clean metal before galvanizing, tinning or retinning. It is a reliable, free-rinsing cleaner.

The high pH value holds up for a long time, making Kenize economical as well as fast and sure.

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Your Name _____
Company _____
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KEN

AUGUST, 1943

ORGANIC FINISHING

SECTION OF METAL FINISHING

LACQUERING • ENAMELING • JAPANNING • PAINTING

always up-to-date

ACCURATE

COMPLETE

Military requirements for finishes are frequently changing, therefore Zapon is in continuous contact with Government specifying agencies so that its information on specifications is always up-to-date. In turn our laboratories and the users of these finishes are kept constantly informed so they can keep abreast of developments.

Here's another example of the synergistic approach we have been talking about. It proves highly profitable all around and helps solve problems speedily. In this case synergism helps to recognize clearly the job to be done, the materials needed for the finish, the best procedure for fast production, how to get the best results at reasonable cost.

WHAT IS SYNERGISM?
In Synergism, forces—minds—work together to produce results greater than both working separately might achieve, making 2 + 2 = 5.

You are invited to write for a copy of our folder on U. S. Government Specifications. Why not also let us know when we can get together for a synergistic session?

ZAPON

ZAPON DIVISION · ATLAS POWDER COMPANY

Eastern Sales: Stamford, Conn. *Western Sales: North Chicago, Ill.*

INDUSTRIAL FINISHES

Section of
METAL FINISHING
Founded January, 1903 as Metal Industry
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ORGANIC FINISHING

SECTION OF METAL FINISHING

AUGUST, 1943

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Cover Photograph

Pillow blocks being sprayed with low pressure equipment. — *Courtesy of Eclipse Air Brush Co., Inc.*

Selling Ourselves

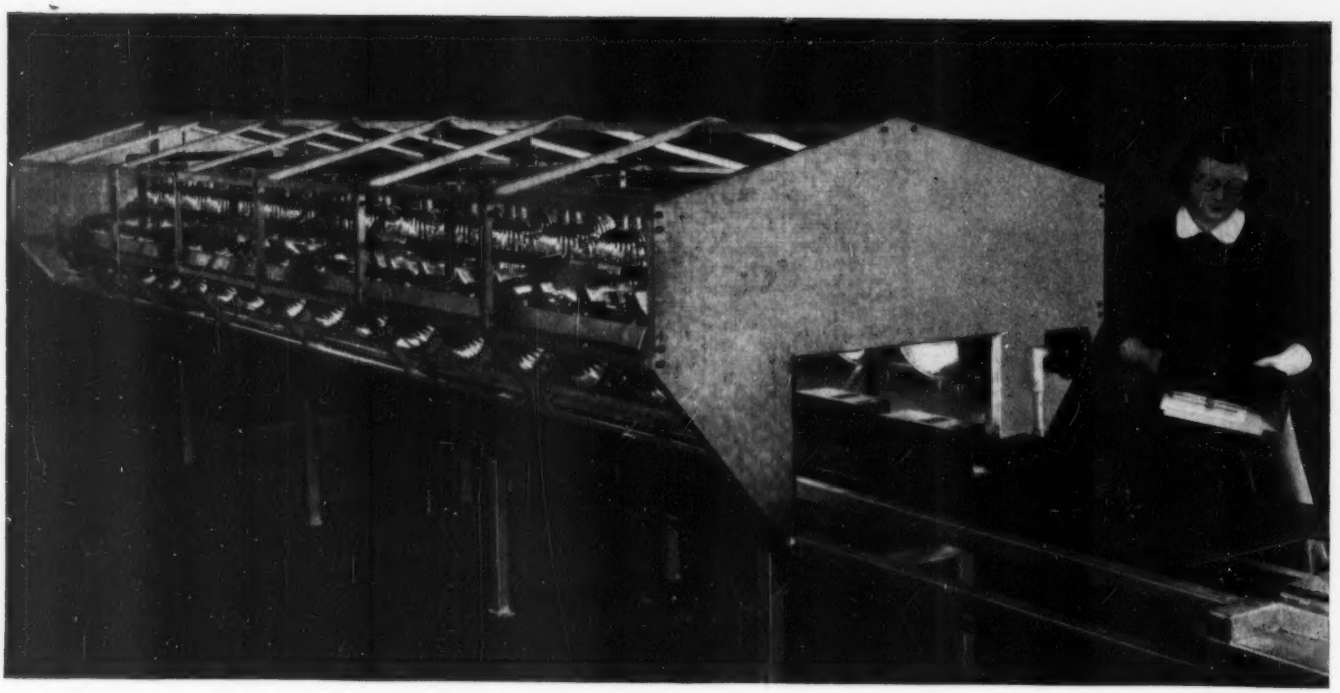
It was our good fortune to hear an address made recently by Mr. T. Spencer Shore, vice president of the General Tire and Rubber Company. The occasion was a dinner of the New York section of the American Institute of Chemical Engineers. Mr. Shore's subject was "Industry, People and Government" and among other things he said, "I have watched with a great deal of interest the attitude of many of the people in industry toward anyone in a government position. If we are not successful in selling our idea, many of us immediately start criticizing the individual and telling him to his face that he is one of those long haired professors who never had any practical business experience."

Mr. Shore was speaking of industry in general. However, he might have been referring to a few—not many, but still a few—in the finishing industry. We have heard grumbles about government finishing specifications and war time regulations and restrictions on finishing. The main criticism seems to be that some specifications and regulations appear to have been written without any consideration of many of the problems of actual finishing room procedure.

We admit that some criticisms are probably justified. However, the technique mentioned by Mr. Shore is certainly not the correct approach. It is assumed that any of the ideas on finishing that we try to sell are good ones—good for the war effort and good for the industry. Certainly in these days we can not waste our time trying to sell any bill of goods. We must present the facts as they are, pointing out advantages and showing where time or money or labor can be saved.

After all, we in the finishing industry are the finishing experts. The various groups in government departments whose responsibility it is to handle finishing specifications and the like are capably staffed. Many of the members of these groups are from the finishing industry itself. However, no relatively small group is absolutely infallible. In some cases all of the factors might not have been known when, for example, a specification was written. But the finishing industry does know most of the answers. It is, therefore, our responsibility to help with our knowledge. Simply having the knowledge is not enough. Having it and calling names is worse than nothing. Give your ideas, "sell" them if that is necessary, and you will be doing your part.

L. H. LANGDON, *Publisher* • T. A. TRUMBOUR, *Business Manager*



IN THE DRYING AND BAKING OF FINISHES

What MEANS MOST *to you?*

- **Conserving manpower?**
- **Increasing production?**
- **Saving space?**
- **Reducing spoilage?**
- **Conserving fuel?**

On all these five counts — and others — a Gifford-Wood Infra-Red System could score heavily in your favor. Consider a typical installation:

Number of employees halved, baking speeded from 45 minutes to 10¼, cooling time shrunk 10%, fuel cost reduced 33%. On top of all that, important savings were made in costs of paint, insurance and maintenance.

Gifford-Wood is ready to design, produce and install a complete Infra-Red System for you, including conveyors and all details—under a performance guarantee. If you are still oven-drying and baking finishes, step ahead with Infra-Red. Gifford-Wood can show you how. As a first step, write for Bulletin 0-150.

GIFFORD-WOOD CO.

FOUNDED 1814

New York: Graybar Building **HUDSON, N. Y.** **Chicago: 565 W. Washington Street**

HEADQUARTERS FOR INFRA-RED BAKING AND DRYING

3666

THIS IS WASHINGTON—

By George W. Grupp

METAL FINISHING's Washington Correspondent

Wholesalers' 1943 Sales & Inventories The Census Bureau of the United States Department of Commerce with the cooperation of the National Association of Credit Men made an analysis of wholesalers' sales and inventories covering the first five months of 1943. From that analysis this table was compiled.

Kind of Business	*No. Firms Reporting Sales*	*Sales First Five Months, 1943*	*No. Firms Reporting Inventories*	*Inventory On May 31, 1943*
Chemicals, Industrial	16	$ 9,806,000	12	$ 838,000
Paints and Varnishes	60	17,489,000	14	1,223,000
Metals	30	27,235,000	17	3,697,000

Kind of Business	*Number of Firms Reporting*	*Accounts Receivable As of May 31, 1943*
Chemicals, Industrial	14	$ 933,000
Paints and Varnishes	27	1,472,000
Metals	28	3,388,000

Aldehyde Resins Under Control In issuing Allocation Order M-331 on June 16, 1943, urea and melamine aldehyde resins were placed under allocation control. The object of this order is to direct the distribution of these materials from the suppliers to the manufacturers who incorporate the resins in *protective coatings*. Suppliers must use form PD-601 and customers must use form PD-600.

Butyl Alcohol Prices Adjustable The July 1, 1943 Amendment No. 5 to Maximum Price Regulation No. 37 provides that the deliveries of butyl alcohol by producers may now be made on an adjustable price basis in accordance with any action taken by OPA to adjust ceilings.

Glycols Unrestricted In Limited Amounts Allocation Order M-215 was amended on June 25, 1943 to reduce the amount of required paper work in the allocation of glycols. According to this amended order, any person may accept for delivery in a calendar month without specific authorization, 5,000 pounds or less of ethylene glycol, 900 pounds or less of propylene glycol, 1000 pounds or less of diethylene glycol, 250 pounds or less of triethylene glycol and 250 pounds or less of mixed glycols.

Glycol Ethers Under Allocation Control Glycol ethers which are used in the manufacture of synthetic resins, in the preparation of cutting oils and cleaners for metal trades, and as solvents in protective coatings, were placed under allocation control on June 22, 1943 by Allocation Order M-336. Any person who wishes to get more than 400 pounds of monobutyl ether of ethylene glycol or more than 460 pounds of monoethyl ether of diethylene glycol in any calendar month must file an end-use statement on Form PD-600.

Materials In Inventory According to Interpretation No. 1 to CMP Regulation No. 2, dated June 19, 1943, materials will be considered in inventory until they are actually put into process or in actual installation or assemble. This interpretation states that putting into process does not include minor initial operations such as painting, and it does not include shearing, cutting, or trimming unless such operations are part of a continuous operation.

Paints Sales Decline The sales of plastic paints, cold-water paints, and calcimines for the first five months of 1943 were $13,410 less than for the same period in 1942 according to the Bureau of Census of the United States Department of Commerce which compiled their data from the reports of 63 identical manufacturers who produce about 85 per cent of the total output of these commodities. Here are the actual figures:

Commodity	*Total (5 months) 1943*	*1942*
Plastic Paints	$ 208,302	$ 225,734
Cold-Water Paints (Paste, Semi-paste, or Dry Powder Form)	3,626,950	3,308,340
Calcimines	589,133	876,901
Total	$4,424,385	$4,410,975

Protective Coating Oils Under Control All raw, crude, refined and pressed oils used for protective coatings, irrespective whether they are animal, fish, marine animal or vegetable, but not including mineral and tall oil, were placed under control by Conservation Order M-332, dated June 17, 1943. The formulas for protective coatings which were designated in the order are based on the recommendations of a task committee of the industry. These formulas were carefully tested by individual manufacturers, by the National Bureau of Standards, and by the National Paint, Varnish and Lacquer Association.

Red Lead and Orange Pigments Exempt Amendment No. 1 to Revised Maximum Price Regulation No. 180, issued on June 25, 1943, exempts red lead and orange mineral color pigments from this OPA regulation on color pigments.

Fats and Oils For Paints and Varnishes In an analysis recently released by the United States Agriculture Department, the consumption of fats and oils in paints and varnishes in the United States for the years 1938 to 1942 inclusive was estimated. From that analysis the following table was compiled.

ITEM	1938 1,000 lb.	1942 1,000 lb.
Linseed oil	407,614	654,899
Tung oil	81,190	16,430
Perilla oil	32,773	3,177
Fish oil	15,679	21,235
Soybean oil	15,183	25,307
Oiticica oil	5,080	8,094
Castor oil	5,792	50,473
Coconut oil	422	180
Cotton seed oil	184	418
Rape oil	131	40
Corn oil	118	63
Babassu oil	—	23
Palm oil	1	—
Olive oil, inedible	6	2
Peanut oil	—	5
Other vegetable oils	300	235
Grease	144	206
Tallow, inedible	117	160
Marine mammal oil	28	3
Neat's foot oil	9	40
Oleo oil	2	2
Tallow, edible	—	4
TOTAL	564,773	780,996

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A SPRAYING QUESTIONNAIRE

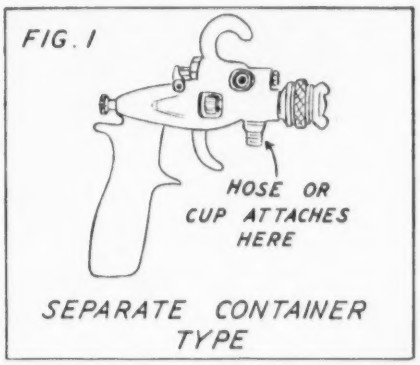
This is the second of a series of questions and answers dealing with the application of finishing materials. The first, A Dipping Questionnaire, appeared in the November, 1942 issue of the Organic Finishing Section. This group answers many of the most frequently asked questions on spraying and spraying equipment. In the various answers, useful information on spray gun types, care of spraying equipment, proper spraying technique, correction of spray troubles, etc., will be found.—Ed.

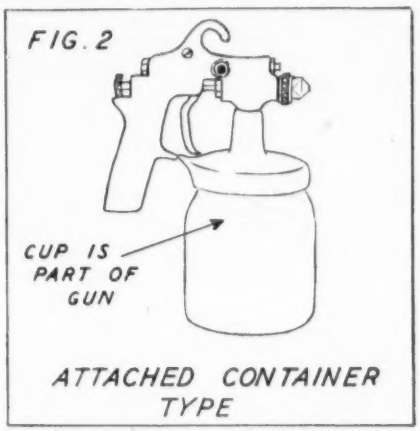
Question. What is a spray gun?

Answer. A spray gun is a mechanical means of bringing together a finishing material and compressed air, atomizing or breaking up the finishing material into a spray, and ejecting the finishing material for the purpose of applying it to an object.

Question. What types of spray gun are there?

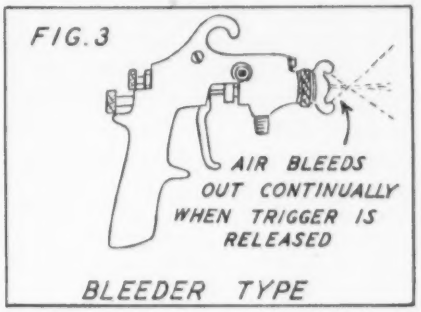
Answer. Spray guns are of the separate container (Figure 1) or the attached container (Figure 2) type. These two types may be further divided into bleeder and non-bleeder, external and internal mix, gravity and suction, etc., types.

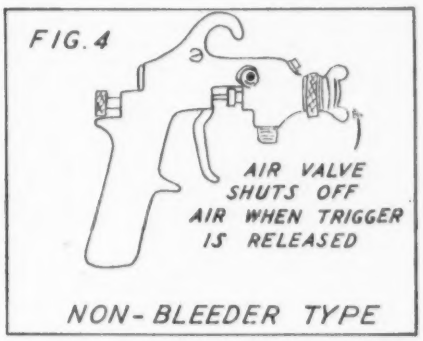




Question. What is a bleeder type gun?

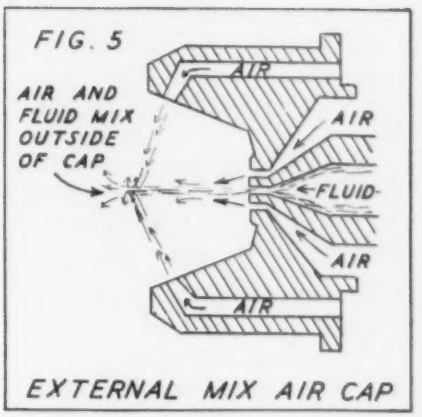
Answer. A bleeder type gun is one designed to allow leakage of air. This bleeding prevents air pressure building up in the air hose. Bleeder type guns are used with small air compressor units having no pressure controlling device. In such guns the trigger controls only the flow of fluid. (Figure 3.)





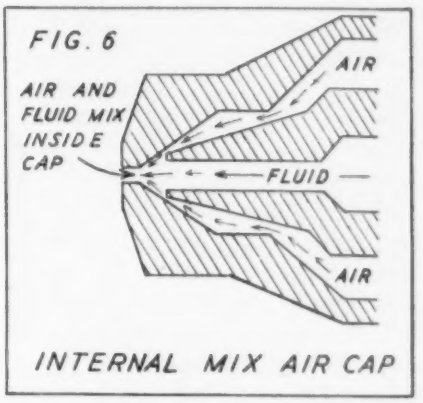
Question. What is a non-bleeder type gun?

Answer. A non-bleeder type gun is one equipped with an air valve which shuts off the air when the trigger is released. In this type of gun, the trigger controls both air and fluid. It is used with compressing units having a pressure controlling device. (Figure 4.)



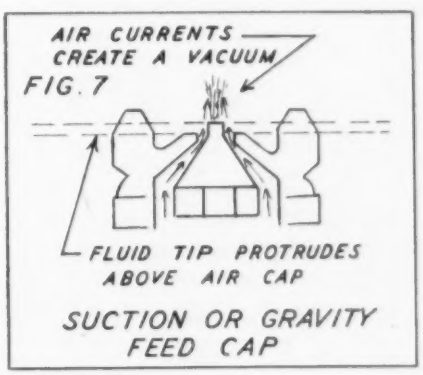
Question. What is an external mix type gun?

Answer. An external mix type gun mixes the air and finishing material outside the gun. (Figure 5.)



Question. What is an internal mix type gun?

Answer. An internal mix type gun mixes the air and the finishing material inside the gun. (Figure 6.)



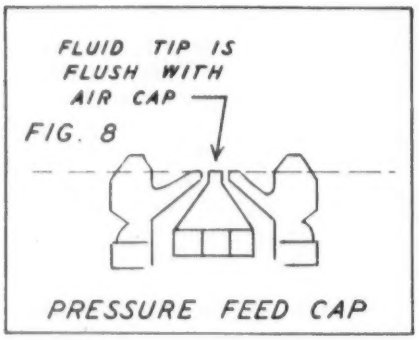
Question. What is a suction feed type gun?

(Illustrations and material for this article courtesy DeVilbiss Co., Toledo, Ohio.)

Answer. A suction feed gun is one designed to create a vacuum at the nozzle and thus draw the material from the container to the gun. This type of gun is usually limited to use with containers of one quart or less capacity. (Figure 7.)

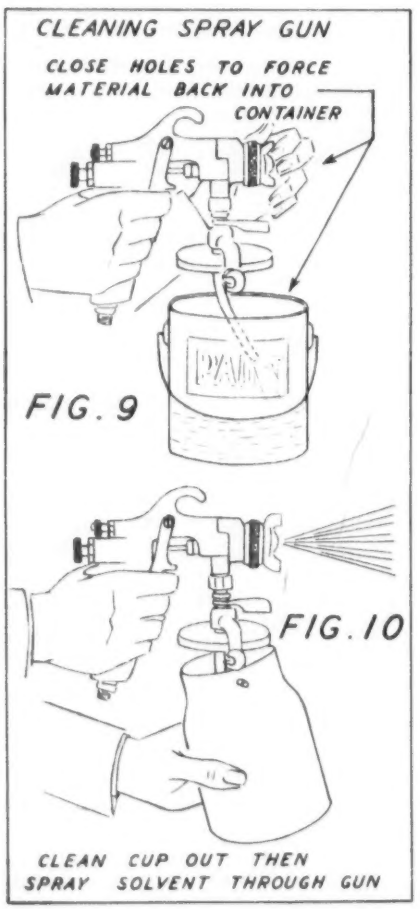
Question. What is a pressure feed type gun?

Answer. A pressure feed gun is one with which air pressure is employed to force the material from the container to the gun. (Figure 8.)



Question. What is a gravity feed type gun?

Answer. A gravity feed gun is one which can be fed with material from an overhead container by the force of gravity.

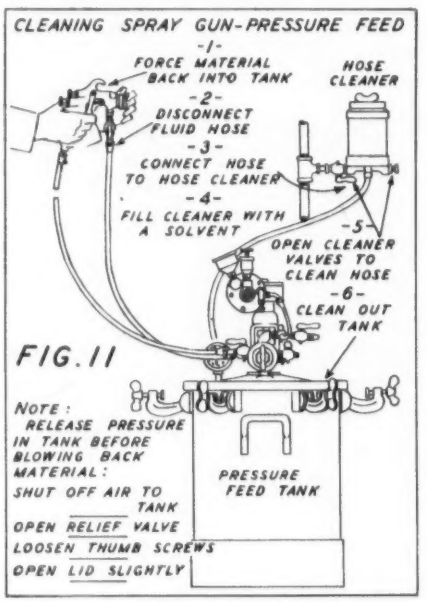

CLEANING SPRAY GUN
CLOSE HOLES TO FORCE MATERIAL BACK INTO CONTAINER
FIG. 9
FIG. 10
CLEAN CUP OUT THEN SPRAY SOLVENT THROUGH GUN

Question. How should a suction feed type gun be cleaned?

Answer. Remove cup from gun. Hold cloth over nozzle and pull trigger to force material back into container. (Figure 9.) Clean cup and, using a small amount of thinner, spray thinner as usual to clean passageways. (Figure 10.) Remove and clean nozzle, wash off fluid tip with thinner, and replace nozzle.

Question. How should a pressure feed type gun be cleaned?

Answer. Release pressure in tank. (Figure 11.) Hold cloth over nozzle and pull trigger to force material back into tank. Remove and clean fluid hose with thinner or by using a hose cleaner—a device for cleaning fluid hose by forcing air and thinner through it. Spray thinner through gun and clean nozzle and fluid tip with thinner. Clean tank and reassemble for future use.


CLEANING SPRAY GUN-PRESSURE FEED
-1- FORCE MATERIAL BACK INTO TANK
HOSE CLEANER
-2- DISCONNECT FLUID HOSE
-3- CONNECT HOSE TO HOSE CLEANER
-4- FILL CLEANER WITH A SOLVENT
-5- OPEN CLEANER VALVES TO CLEAN HOSE
-6- CLEAN OUT TANK
FIG. 11
NOTE: RELEASE PRESSURE IN TANK BEFORE BLOWING BACK MATERIAL:
SHUT OFF AIR TO TANK
OPEN RELIEF VALVE
LOOSEN THUMB SCREWS
OPEN LID SLIGHTLY
PRESSURE FEED TANK

Question. How should the nozzle be cleaned?

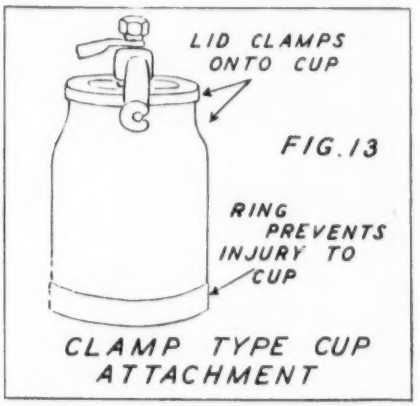
Answer. To clean a nozzle, simply immerse it in thinner. Soaking may be necessary to clear holes. If it does not, use a broom straw or toothpick to remove clogged material. Digging out any obstruction with a nail or wire may cause damage.

Question. What are material containers?

Answer. Material containers are metal, glass, or paper vessels connected to the gun serving as supply reservoirs for the material to be sprayed. There are three types of containers, namely, cups, tanks, and buckets.

Question. How many types of cup container are there?

Answer. There are three types of cup container, namely, suction cups (Figures 12-15), gravity cups (Figure 16), and pressure cups (Figures 17 and 18). The equalized pressure cup differs from the regulator pressure cup in that it does not have a means of pressure control.



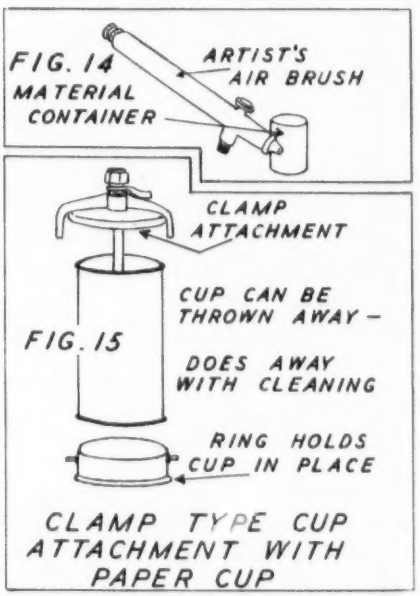
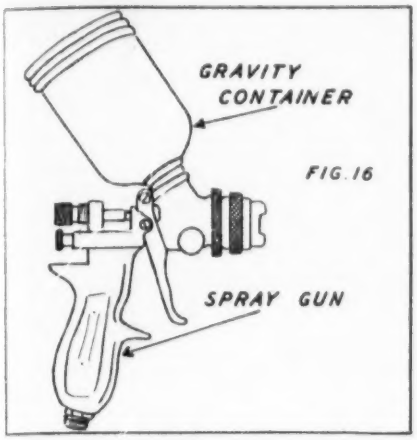
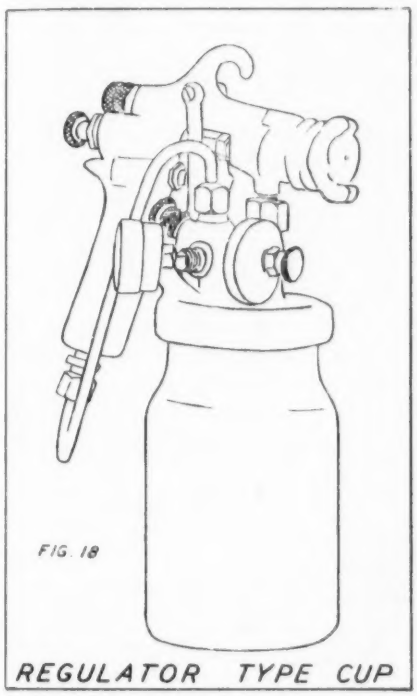


FIG. 14
ARTIST'S AIR BRUSH
MATERIAL CONTAINER
CLAMP ATTACHMENT
CUP CAN BE THROWN AWAY — DOES AWAY WITH CLEANING
FIG. 15
RING HOLDS CUP IN PLACE
CLAMP TYPE CUP ATTACHMENT WITH PAPER CUP

Question. Where are cup containers used?

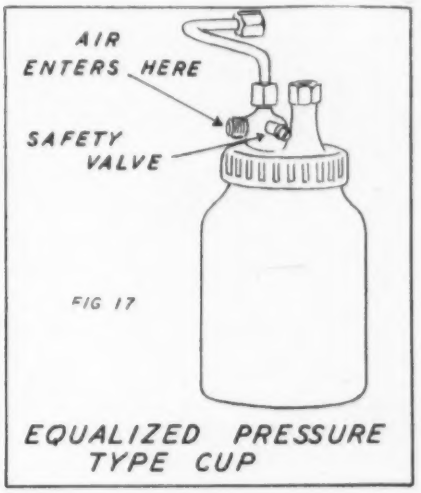
Answer. Cup containers are used where a variety of colors and materials in comparatively small quantities is to be sprayed.

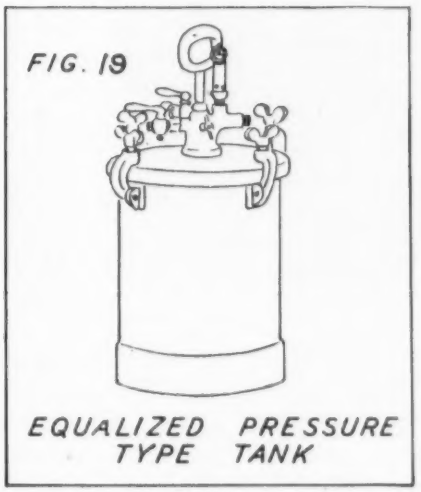




Question. How many types of pressure feed tank are there?

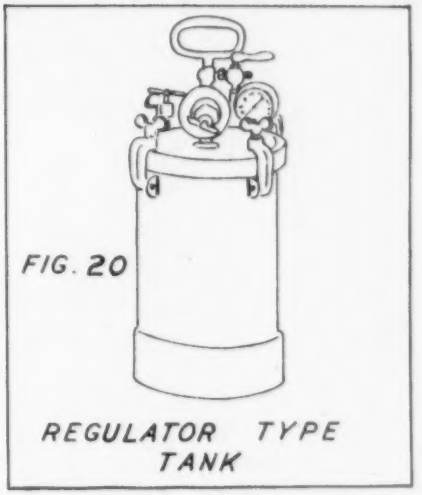
Answer. There are two general types of pressure feed tank, namely, equalized pressure tanks (Figure 19) and regulator pressure tanks (Figure 20.) Regulator tanks may be of the single or double regulator type. Single regulator tanks (Figure 21) are equipped to control only the fluid pressure. Double regulator tanks control both fluid pressure and air pressure to the gun. (Figure 22.)





Question. Where are pressure feed tanks used?

Answer. Pressure feed tanks are recommended for continuous production where positive, uniform, and large volume flow of material must be maintained.



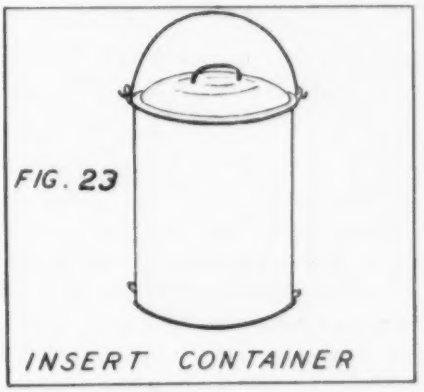
Question. When are pressure tanks equipped with agitators?

Answer. When finishing materials tend to settle, the use of agitators is recommended. Agitators may be direct motor (electric or air) driven, belt driven, or hand driven.

Question. What are inserts?

Answer. Inserts are containers that are set inside the tank and filled with the material to be sprayed. (Figgure 23.) They are used, rather than pouring the material directly into the tank, to eliminate cleaning the tank, for the convenience of changing quickly from one material to another, etc.

(To be concluded next month)



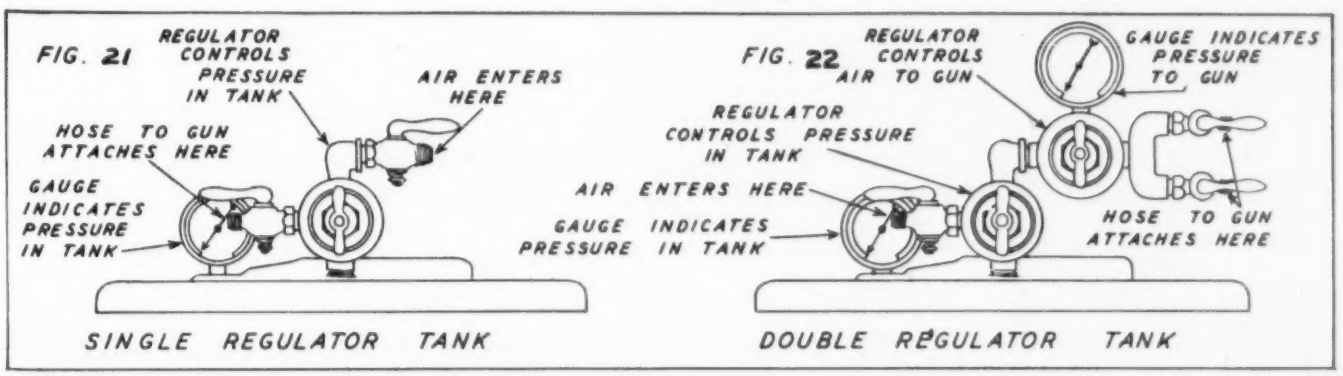


FIG. 21
REGULATOR CONTROLS PRESSURE IN TANK
AIR ENTERS HERE
HOSE TO GUN ATTACHES HERE
GAUGE INDICATES PRESSURE IN TANK
SINGLE REGULATOR TANK
FIG. 22
REGULATOR CONTROLS AIR TO GUN
GAUGE INDICATES PRESSURE TO GUN
REGULATOR CONTROLS PRESSURE IN TANK
AIR ENTERS HERE
GAUGE INDICATES PRESSURE IN TANK
HOSE TO GUN ATTACHES HERE
DOUBLE REGULATOR TANK

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C-8

CHEMICALS ACP PROCESSES

Cleaning Drums

Which Have Held Flammable Substances

This Industrial Data Sheet is one of a series of more than 75 published by the National Safety Council. It is a compilation of experience from many sources. It should not be assumed, however, that it includes every acceptable procedure in the field covered. It must not be confused with American Standard Safety Codes; federal laws, insurance requirements; state laws, rules and regulations, and municipal ordinances.

Problem

What are the hazards involved and what precautions should be observed in cleaning drums which have held flammable substances?

Hazards

The principal hazards in cleaning drums are:

(1) burns from caustics
(2) burns from contact with hot containers and steam lines
(3) burns from hot cleaning solutions
(4) fire
(5) explosions.

Discussion

Drums that have held flammable substances, such as oils, solvents, shellac, etc., should be thoroughly cleaned before refilling and before repair by welding. Vapors which fill the "empty" drum or which may be entrained in sediment or scale are likely to ignite and explode should a source of ignition be present.

Cleaning Method

First—Remove all sources of ignition, such as open flames and unguarded electric lights, from the vicinity of the drums to be cleaned.

Second—Remove the bungs with a special, long-handled wrench and permit the drum to drain. Examine the inside for rags, waste or other debris that might interfere with the free draining. Wrenches used should be made of non-sparking materials. Steel chisels and hammers should never be used for removing bungs.

Third—Place drums on a steam rack with the bung holes at the lower point, and allow the drums to drain for five minutes. All residue should be disposed of in a manner that will not increase the hazard.

Fourth—Apply steam to the drums for a minimum of 10 minutes. (Drums that have contained shellac, turpentine, or similar materials require longer steaming to remove residue and vapors.)

Fifth—Remove drums from steaming rack and partly fill with caustic soda or soda ash solution, and rotate the drums for a minimum of five minutes. Short pieces of brass chain inserted with the caustic wash will act as a scrubber and aid in loosening caked sediment. Light hammering with a wood mallet will also help to loosen scale. (See Note A.)

Sixth—Thoroughly flush the drums with hot water. Flushing can be accomplished by means of a water spray nozzle placed six or eight inches inside the drum. The interior should be sprayed for a minimum of five minutes with water at boiling temperature. Drums should be placed so the water will drain out the bung opening during the spraying operation. (See Note B.)

Seventh—Hose down the outsides of the drums with a hose stream of hot water.

Eighth—After draining, the drums should be thoroughly dried. This is usually done by circulating warm air through the inside.

Ninth—Thoroughly inspect the interiors of the containers. This can be done by using a special explosion-proof electric light protected with a wire guard and placed inside the container. The connections on the light should be tight, and the wiring should pass through a non-conductive handle about 30 inches long. The lamp assembly should always be maintained in safe condition. With the aid of a small mirror, it can be determined whether the entire inside of the drum is clean. If it is not clean, the cleaning process should be repeated. (See Note C.)

Tenth—Test the container for the presence of explosive vapors. This should be done preferably by means of an explosive gas indicator. A similar test should be made just before any welding repair operations are performed.

NOTE A—Employees handling caustic solutions should be equipped with approved-type head and eye protection and should wear rubber gloves, boots and aprons. In addition, when handling dry caustic soda or soda ash, they should be equipped with an approved-type respirator, and should wear long sleeves and gloves.

NOTE B—When steam or hot water is used to clean a drum, the operator should wear rubber boots, gloves and aprons as protection against burns. In some cases, it is advisable to use asbestos hand pads or gloves when handling the hot drums. When it is possible to come into contact with steam lines or other hot surfaces, they should be insulated or otherwise guarded. When steam is used, the nozzle of the hose should be of a non-sparking material; it should make metal to metal contact with the drum, and the drum should be grounded to prevent the accumulation of static electricity.

NOTE C—The light used for inspecting a drum should be an explosion-proof portable electric hand lamp or an electric extension lamp. If the latter is used, the lamp should be protected by a guard made of non-sparking material. It should be approved for such uses by Underwriters' Laboratories, Inc., or Factory Mutual Laboratories.

Revised by J. C. Stennett, safety engineer, Industrial Division, National Safety Council.

(From Industrial Data Sheet No. D-Chem. 10, reprinted by permission of National Safety Council, Chicago, Ill.)

The Importance of Phosphate Treatment and Paint in Rustproofing

Conclusion

By GEORGE H. PIMBLEY

General Superintendent, International Rustproof Corp., Cleveland, Ohio

IT is apparent that all of the cleaning methods discussed in the previous portion of this article have drawbacks and leave much to be desired. Therefore, it is logical to consider more effective methods, even though the expense may be increased somewhat. Such improvement may be achieved through the use of phosphoric acid. This acid differs from other acids in its action on iron, steel, and zinc in that it forms compounds with these metals which are more or less insoluble in water and weak acids. Acids such as hydrochloric and sulfuric form water soluble compounds. When steel is pickled in hydrochloric or sulfuric acid, the products of the reaction are mostly dissolved and washed away by the rinse water. Also, traces of acid and iron salts which remain on the metal after rinsing will act as future rust stimulants. Relatively strong phosphoric acid has an etching or pickling action on iron and zinc similar to that of other acids and is fully as effective in removing scale, etc. However, it forms a series of salts of which a part is insoluble and becomes firmly interlocked with the pores of the metal where it remains as a permanent non-metallic rust preventive deposit. These salts are of three types, namely, primary, secondary, and tertiary phosphates. The primary phosphates are easily soluble and are formed in largest proportion when the acid is strong. The other two types are relatively insoluble and are formed in greatest proportion when the acid solution is weak.

Combination Cleaners

It may be seen that phosphoric acid is very useful in conditioning metal for painting. Let us assume that a steel surface is contaminated with a moderate amount of grease and oil, the usual perspiration stains resulting from handling, and soldering residues. What is the most convenient and economical method of conditioning the metal? A good procedure is dipping or swabbing the surface with a combination cleaner which includes a proportion of phosphoric acid with a balanced selection of oil and grease solvents and wetting agents. The correct formulation that combines the proper amounts of these various ingredients into an efficient metal conditioner is the result of long experience and research. There are several products of this kind on the market which serve very well.

The wetting agent of the combination cleaner spreads the solution evenly over the surface and permits it to take hold. The solvents carry away the oil and grease so that the phosphoric acid can act on the metal. After the interfering substances have been cleared away, the phosphoric acid reacts with the iron, dissolving some of it and forming the phosphates described above. The surface is then wiped dry with clean rags or is rinsed in cold or hot water and thoroughly dried. The result is that the contaminating oils, greases, and dirt are removed. The oil and the organic acid of fingerprint perspiration are removed. Rust and soldering residues are dissolved. The smooth surface of the metal is etched and textured so as to afford a "tooth" to hold paint. And finally, a slight deposit of relatively insoluble and rust inhibiting phosphates is left in the pores of the metal.

While the metal conditioners described above do an excellent cleaning job, they fall short of producing a really effective phosphate coating on the metal because conditions are not right for the formation of a substantial coating of insoluble phosphates. If maximum protection is to be obtained with a paint job on objects subject to severe conditions, it is important that there be an appreciable coating of phosphates between the paint and the metal. A sufficient deposit of this non-metallic and non-conducting substance, firmly and uniformly interlocked with the surface of the metal, provides a good blanket of protection as long as it remains intact. It will inhibit rusting because it eliminates corrosion couples, that is, points of different potential on the surface and because it is non-conducting it insulates and blocks the electrochemical cycle of rusting.

Since the deposit of phosphates is quite insoluble, it shuts out water from the underlying metal to a very considerable degree. However, it can not be depended upon to do this completely and permanently because it is somewhat porous and is not completely insoluble. This porosity results in a textured surface which is very valuable in that an anchorage for paint coatings is provided. The paint film is securely held by the phosphate coating, thus aiding in resisting abrasion and other deteriorating influences. In case of accidental gouging, the primer over the phosphate coating will often stay on where otherwise it would be fractured. If the abrasion is severe enough to remove all of the paint in a limited area, the resulting corrosion will be confined to the abraded area. Without the phosphate coating, the corrosion might spread under the paint film and cause complete failure of the paint. The inhibiting layer of phosphates prevents this spreading of rust.

Phosphate Baths

To obtain an appreciably thick coating of phosphates, visible to the eye and showing a white streak when scratched with the finger nail, immersion in a hot bath for a period of a few minutes to an hour is necessary. The time of immersion depends upon the thickness of coating desired. For a paint base, only a few minutes is required. Longer periods are necessary where paints can not be used and where non-drying oils are the only finish. Furthermore, the composition of the solution and all of the other conditions must be quite different from those for the phosphoric type cleaner previously discussed. It is not practicable to combine the cleaning opera-

tion with the hot bath phosphating operations. Therefore, the metal must be entirely freed from grease, oil, dirt, heavy rust, drawing compounds, etc., before phosphating and this cleaning must be thorough. Cleaning is accomplished by one or a combination of the methods already mentioned.

The composition of the bath is such that only a very small amount of free phosphoric acid is present — usually not more than a few tenths of one per cent. This is accompanied by one to two per cent of complex acid phosphate salts of various metals, including zinc and iron. There may also be present certain accelerating agents. The bath is prepared according to manufacturers' directions by adding the chemicals to water in steel tanks equipped with steam coils or other suitable means of heating to a temperature of 180° to 195° F.

The mechanism of the phosphating process is as follows: The clean iron or steel surface is attacked by the small amount of free phosphoric acid present. The phosphoric acid reacts with the iron to form iron phosphate, with the elimination of hydrogen as a gas. Enough hydrogen ions are withdrawn from the solution immediately adjacent to the iron surface to lower the solution capacity for phosphates. The liquid adjacent to the surface becomes supersaturated with phosphates and there is a precipitation of the mixed phosphates of the metals. The precipitation is cemented and interlocked into the pores of the metal surface as a coating which becomes an integral part of the metal.

It should be kept in mind that a phosphate coating is not a complete finish in itself and in no way takes the place of paint. True, it is used for certain moving parts and small threaded parts where paint can not be employed. In such cases, a non-drying oil is used. The phosphate coating serves as a matrix to hold the oil which prevents rusting. With these exceptions, all phosphate coated surfaces should be finished with a suitable paint. This is necessary because the phosphate coating does not possess the mechanical strength or complete inertness to serve alone as a satisfactory coating. Its function is to act as a bonding and rust inhibitive layer between the metal and the paint.

There are no special types of organic finishes more suited than others for use over phosphate coatings. The same schedule of finishes, applied in the same manner, should be used over phosphate coated metal as over bare metal. The durability of all finishes is greatly improved by the use of phosphating. Those paints having poor adhesion will, of course, benefit most. In general, it may be said that a substantial phosphate coating will prolong the life of any organic finish applied over it three to five times.

Occasionally, the objection is made that paint applied over phosphating appears blotchy. In such cases investigation usually discloses that the phosphate coating has been built up too heavily or not uniformly. For a paint base the phosphating need be only a thin film—just enough to show a white

(*Concluded on page* 543)

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ARMOR-VIT is ceramic in nature, and there is no relationship or comparison between **ARMOR-VIT** and porcelain enamel, paint, lacquer, or synthetic finishes. It is non-volatile; non-explosive. The coating is only 1/1000th of an inch in thickness—so it goes farther and lasts longer. There is an accredited **ARMOR-VIT** applicator convenient to your plant. Write for full details.

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HIGHLY RESISTANT TO RUST, CORROSION, HEAT, IMPACT, ABRASION, SCRATCH, ACID, ALKALIES

Bullet "Footprints" in Lacquer Aid Search for Better Weapons

THE lacquer-held "footprints" of a bullet crashing into steel plate are giving scientists new information which may aid in the development of tougher armor and better armor-piercing shells for the nation's fighting men. The "footprints" are thin, closely spaced cracks which appear on a lacquer-coated steel target under the impact of

Spraying lacquer on gear tooth model to detect strains.

a speeding bullet. Dr. Miklos Hetenyi is conducting the experiments in the Westinghouse Research Laboratories.

Some shots fired in the laboratory create a heart-shaped pattern extending six or eight inches from the spot where the bullet hit or penetrated. In other tests the cracks form a series of circles around the bullet hole. Each tiny crack denotes stretching of the metal underneath the lacquer and gives a permanent picture of the strains that occurred at the instant of impact.

By spraying this smooth lacquer coating known as Stresscoat on metal parts and then contorting them until the brittle skin cracks, Dr. Hetenyi and other Westinghouse research engineers can also detect vulnerable spots in gears, shafts, valves and other parts of vital wartime equipment.

This lacquer coating test, Dr. Hetenyi said, is accelerating improvements in motors, gears and various types of electrical machines because it enables research engineers to locate strains quickly. Life tests are still necessary but the cracked coating process tells when engineers are on the right track in designing new parts.

Just as yawning crevices opened by an earthquake reveal faults deep underground, tiny fissures in the lacquer tell a story of the strains that machine parts experience. Cracks in the glossy finish pick out the "Achilles heel" of an eight-foot-high, two-ton gearwheel or bare the weak points of a flapper valve, a tenth-of-an ounce slice of steel that vibrates back and forth in air cooling machinery.

In one test Research Engineers William E. Young and John J. Gertz put the lacquer coating on a 1600-pound "model" of a gear tooth and squeezed the tooth in a large hydraulic press to locate accurately the stresses. Results of their work were turned over to the

Firing a rifle at a lacquer coated target.

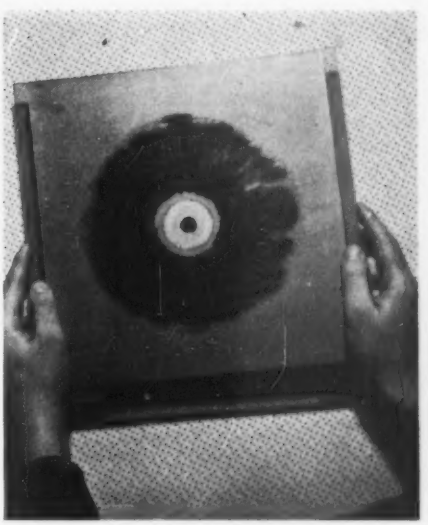
Nuttall Gearing Works of Westinghouse which is manufacturing gears for submarines, subchasers and other war equipment.

Lacquer sprayed on the gear tooth dries in 15 hours to form a tightly clinging skin about as thick as the diameter of a human hair. To determine the slightest strain that will crack this coating, a foot-long steel bar is sprayed at the same time as the gear tooth and under the same atmospheric conditions.

The steel bar is bent in a machine that holds it rigid at one end and depresses it at the other. Most of the cracks in the coating appear at the rigidly-held end and become less frequent until there are none at the end which was pushed down. Then the bar is placed beside a strain scale which is read opposite the point where the last crack occurred. This reading tells the minimum strain, that is, the least amount the metal must "stretch" to split the lacquer.

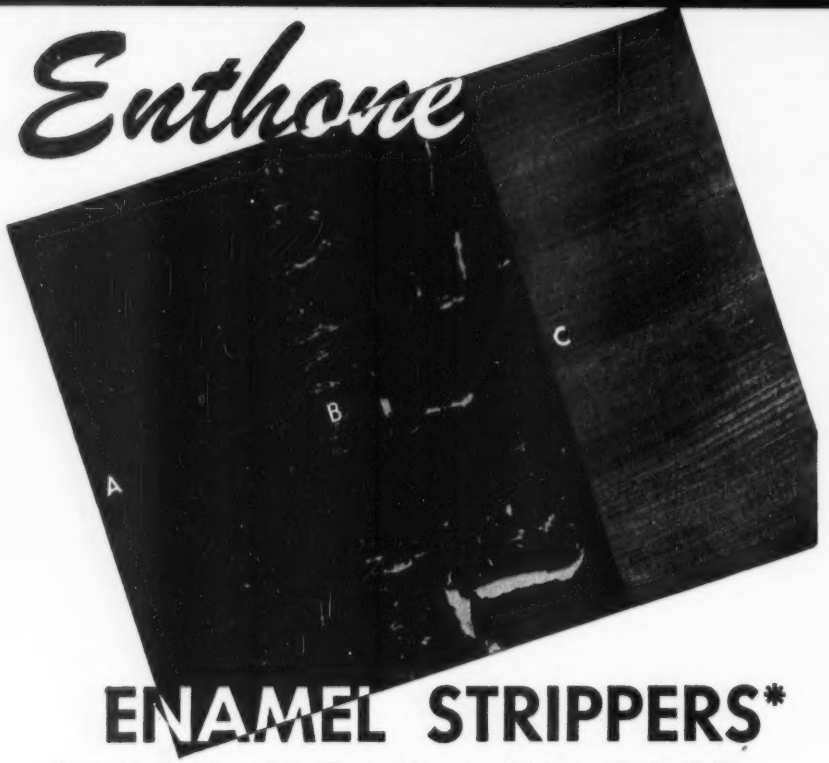
The coated gear tooth is then subjected to the same kind of punishment it would get if at work in a machine. It is slowly squeezed in a press capable of exerting a force of 400,000 pounds while the laboratory workers scan the coating for the first appearance of a crack. With more pressure the "skin" splits in other places and finally the research men have a progressive list of the tooth's weak points.

A similar test was devised for flapper valves, the slivers of tough steel that quiver millions of times a week to regulate the flow of liquids and gases in refrigerators and air conditioning machinery.



Pattern of cracks in lacquer on plastic panel.

Enthone



ENAMEL STRIPPERS*

WORK CLEAN AND FAST

The above panel shows how fast Enthone Enamel Strippers go to work.

Panel "A"—*Original enamel of urea-formaldehyde type*
Panel "B"—*After one minute in stripper*
Panel "C"—*After two minutes in stripper*

Notice that the enamel lifts away from the surface, leaving it clean and unattacked.

Enthone Enamel Strippers do not attack any base metal or anodized coatings.

Consult Enthone for stripping synthetics, japans, lacquers.

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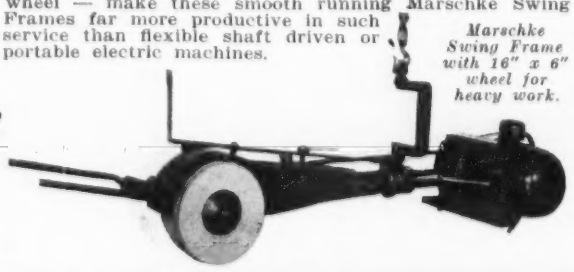
12" x 3" to 18" x 6" Buffing Wheels . . 3 to 20 HP., Single and Multiple Speeds

The Marschke idea of swing frame buffing has taken hold fast in recent years, with good reason . . .

Marschke Swing Frames have proved extra fast and dependable in polishing large or awkwardly shaped surfaces such as kick plates, airplane propellers, locomotive side rods and link motions. Good maneuverability—with the **weight** and **power** to get the most out of any buffing wheel — make these smooth running Marschke Swing Frames far more productive in such service than flexible shaft driven or portable electric machines.

Write for Catalog of bench, pedestal and swing frame Marschke Buffers to Vonnegut Moulder Corp., 1852 Madison Ave., Indianapolis, Ind.



Marschke Swing Frame with 16" x 6" wheel for heavy work.

MARSCHKE QUALITY GRINDERS AND BUFFERS

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Manufacturers' Literature

Polyvinyl Acetate

Polyvinyl acetate, a plastic widely used as an adhesive and binder, is described in a new bulletin, *Polyvinyl Acetate; Solid, Solution & Emulsion Forms,*" issued by the Electrochemicals Department of *E. I. du Pont de Nemours & Co.*, Wilmington, Del.

A thermoplastic resin, polyvinyl acetate adheres firmly to glass, ceramics, metals, wood, leather, paper and other surfaces. It is capable of heat sealing and is stable to light and heat; it is non-toxic, colorless, odorless, tasteless, insoluble in water, but readily soluble in common organic solvents and in emulsion form is finding important applications as a rubber latex substitute, particularly in adhesive compositions, it is said.

Polyvinyl acetate is compatible with and contributes adhesive and thermoplastic properties to certain types of nitrocellulose, phenolic resins, chlorinated rubber and some natural resins. Tough, transparent films and coatings may be prepared from it which are resistant to light mineral oils and animal fats. It is also used in special molding composition.

The bulletin, No. 4-243, describes the properties, applications and other information about the plastic.

Cleaning Catalog

Frederick Gumm Chemical Co., Dept. OF, 538-542 Forest St., Kearny, N. J., have issued the 1943 munitions industry edition of their Clepo cleaning catalog.

This 32-page catalog contains detailed information on the methods, etc. used with their various cleaning materials recommended for use in connection with munitions industry cleaning problems. Of particular interest to users of finishing materials are Clepo 35-0 Stripper for stripping AX736-S Specification Lacquer, Clepo 34 Special Aviation Cleaner for cleaning and etching aluminum previous to painting and enameling, etc.

A copy of the catalog may be obtained by writing to the manufacturer at the above address.

Oven Data

Industrial Oven Engineering Co., Dept. OF, Detroit Ave., Cleveland, O., have issued the second part of *Blueprint for Industry*, a booklet of engineering information on convection heated ovens for batch and continuous heating processes. Described by the company as an engineering guide to aid in knowing more of the basic engineering and handling principles involved in the design of industrial heating equipment, the booklet contains 16 pages of diagrams and descriptions of typical oven designs and recent installations.

The booklet also contains two pages of useful engineering data on specific heats, densities of gases, etc., and various formulae used in industrial heating calculations.

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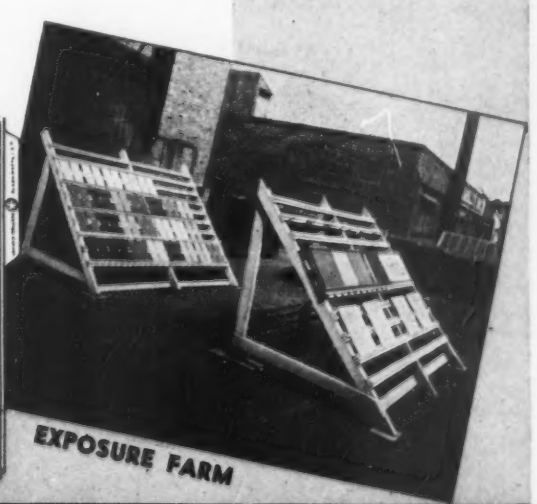

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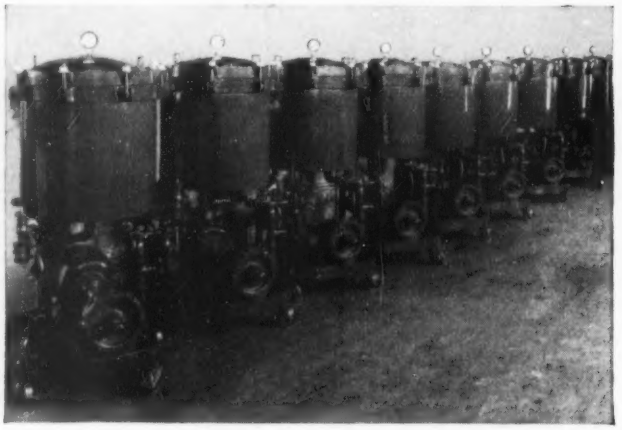

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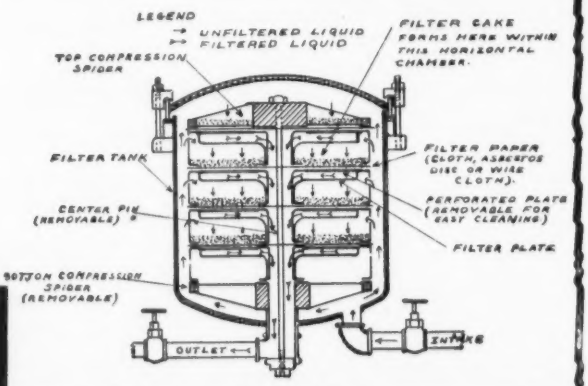
The Sparkler Filter will solve YOUR filter problems.



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Plating and Finishing Guidebook
1943 EDITION

The composite efforts of 25 experts in the plating and finishing industry.

New Sections. *Complete Revision.*

YOUR SUBSCRIPTION TO METAL FINISHING WILL BRING YOU, FREE, THIS AUTHORITATIVE AND MODERN BOOK.

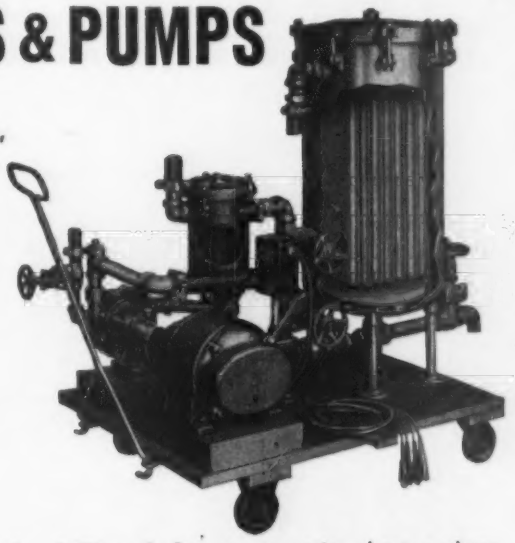
(*Continued from page* 537)

streak when scratched with a finger nail. Such a thin layer can almost always be applied to take paint with a uniform appearance. Because phosphating is used, primers are often omitted or the finishing schedule otherwise skimped. This is not a good practice since much of the benefit of the phosphate coating may be lost.

There is an increasing trend toward the use of zinc plating, particularly flash coats of very thin zinc over steel, to improve corrosion resistance. It is difficult to secure good paint adhesion to such surfaces. Much improvement in adhesion of paints may be obtained by the use of thin, quick phosphate coatings over zinc plated surfaces. This treatment is in line with U. S. Army Jeffersonville Quartermaster Specification No. 144-A.

In conclusion, a very important consideration at the present time is that phosphating plus good paint may be used in many instances to replace metal plating and thus release valuable metals for more important work.

FILTERS & PUMPS



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CORROSION TEST EQUIPMENT

Designed to determine the corrosion resisting qualities of plated or coated metal, alloys, metal parts, organic finishes, etc. This equipment combines necessary features so that Salt Spray tests can be conducted to specifications at Controlled Temperatures to 130 Deg. Fah.

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INDUSTRIAL FILTER & PUMP MFG. CO.

1621-25 West Carroll Avenue **Chicago, Illinois**

Patents

Drum Cleaning Machine

U. S. Pat. 2,319,985. C. Genasci, May 25, 1943. A drum cleaning machine comprising a frame including a pair of parallel angles constituting a drum support, a rotor journalled at one end only on said frame with its axis parallel to said angle and adapted to be disposed within a drum upon said support, means for rotating said rotor, and loose chains secured to said rotor and adapted to strike said drum under the influence of centrifugal force when said rotor is rotated.

Coating Compound

U. S. Pat. 2,320,126. C. H. Crafton & W. W. Castor, assignors to Stoner-Mudge, Inc., May 25, 1943. The method of preparing an incompletely resinified coating compound free of volatile solvent, capable of being spread and of being thereafter completely resinified under heat, which consists in milling together in pure state, in the absence of volatile solvent or diluent, with reaction, and under heat-dissipating conditions and with a temperature rise to a peak of substantially 175° F. a drying oil and an unmodified, oil-soluble, alkaline-condensed, heat-and-oil-reactive, resinous phenol-aldehyde reaction intermediate.

Asphalt Coating Method

U. S. Pat. 2,320,255. R. F. Bacon & I. Bencowitz, assignors to Texas Gulf Sulphur Co., May 25, 1943. The method of forming an asphalt coating which comprises spraying an asphaltic fluid mixture of asphalt and an inflammable organic compound in the direction of the surface to be coated, and igniting the spray and burning off a part of the inflammable agent, thereby heating the asphalt to a relatively high state of fluidity before it strikes the said surface and forming an asphalt coating which adheres to the surface with great tenacity.

Paint Can Handle & Brush Wiper

U. S. Pat. 2,320,262. T. D. Campbell, May 25, 1943. A device of the class described including a supporting handle having spaced gripping members for engagement beneath the friction groove of a paint can and offset with respect to the center of said can, clamping members pivotally mounted on the handle and adapted to engage the top of the can at said gripping members and cooperating therewith to prevent displacement of the handle, and a wiping bar carried by the handle and having its intermediate portion extending transversely of the top of the can in spaced relation to the inner wall thereof, said wiping bar being provided with depending loops fitting within the open top of said paint can.

Flatting Composition

U. S. Pat. 2,320,527. F. J. Licata, assignor to National Oil Products Co., June 1, 1943. A process of incorporating a flatting agent into a coating composition, which comprises admixing a non-polar solvent solution containing a fluidifying agent and at least 3% of a water-insoluble soap of a saturated higher fatty acid with a composition selected from the group consisting of substantially water-free varnishes and lacquers containing an organic polar compound, whereby the soap is precipitated and dispersed within the composition.

Give
metal surfaces the
protection of

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CORROSION INHIBITING
WAXES

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Johnson's Corrosion Inhibiting Waxes possess a great advantage over ordinary shop coatings in that they are non-flammable. They are also non-toxic. They come ready to use; no mixing or dilution is necessary.

Johnson's Corrosion Inhibiting Waxes provide a desirable *dry* finish. They are easy to apply either by dip or spray methods. Coverage is excellent; drying is rapid.

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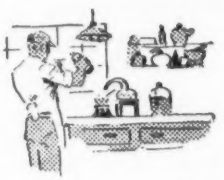

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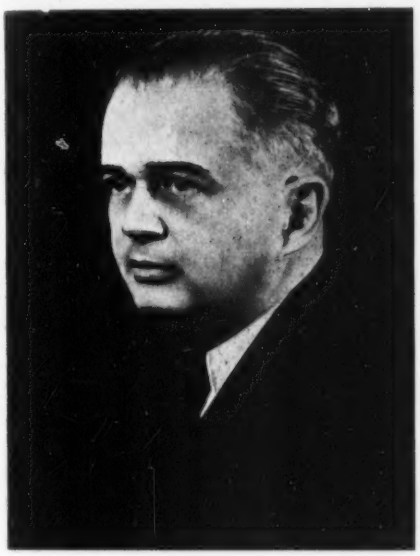
Business Items

The Barber-Colman Co., announces the appointment of the *Edwin C. Anderson Co.*, 1863 Wazee St., Denver 2, Col., as their distributor for Temperature Control and Uni-Flo products for the states of Colorado, Wyoming, and the three western-most tiers of counties in the state of Nebraska.

Mr. Anderson has been long associated with the heating, ventilating, and air conditioning industries and is well known to the users of this type of equipment.



Dr. Robert F. Ruthruff

The Sherwin-Williams Co., paint and varnish manufacturers, have announced the appointment of *Dr. Robert F. Ruthruff* as director of research for Sherwin-Williams and their allied companies.

Dr. Ruthruff, a graduate of the University of Michigan as well as a former member of the teaching staff of that institution, is known for his experimental and research work on various oils, greases, resins, and their by-products. Prior to joining the Sherwin-Williams organization in 1939, he was associated with E. I. du Pont de Nemours & Co., Standard Oil Co. of Indiana and The M. W. Kellogg Co. Prior to his appointment as research director, Dr. Ruthruff was in charge of oil research for Sherwin-Williams Co. In this position he worked on both the development and production of raw materials from various petroleum fractions for the making of resins and synthetic drying oils.

Charles F. Rohleder has been appointed factory superintendent of *Maas & Waldstein Co.*, Newark, N. J.

Mr. Rohleder, who has held the position of chief chemist of Maas and Waldstein since 1937, is a graduate of Cooper Union, class of 1926, with a degree of Bachelor of Science in chemistry.

"THIS WON'T GET UNDER MY SKIN!"
says the aluminum-protected plywood plane

A TRAINING plane doesn't mind how wet it gets—as long as the water doesn't get under the painted surfaces of wing and fuselage. For under-the-skin water can cause paint failure and raise the grain of the wood.

For that reason, many training plane manufacturers are using aluminum paint made of Permite aluminum paste or powder. Layer upon layer of overlapping aluminum flakes form an armor-like protective coating which moisture has great difficulty in penetrating. The results are shown in longer flying-life and better flying performance.

This is but one of many production applications of Permite Aluminum Finishes, including Ready-Mixed Aluminum Paints, where extra resistance to moisture, heat, fumes or oxidation is essential.

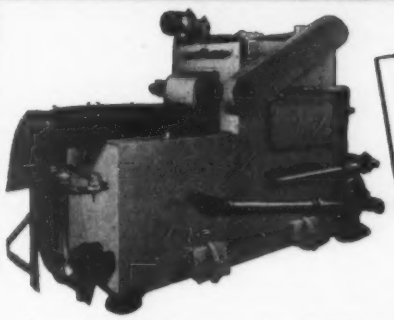
If you have finishing jobs requiring the special protective qualities of aluminum paint for wood or metal surfaces, write us for latest rulings of the War Department on supplying aluminum paints for war production requirements.

ALUMINUM INDUSTRIES, INC., . . . CINCINNATI, OHIO

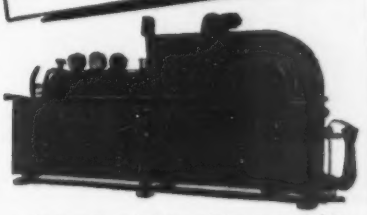
PERMITE READY-MIXED ALUMINUM PAINTS

PERMITE INDUSTRIAL FINISHES

AUTOMATIC METAL CLEANING EQUIPMENT



Spray or Submerged Types
Solvent or Alkali Cleaning
Completely Automatic
One Push-Button Control



Save manpower and speed production with Barry-Wehmiller Metal Cleaners, designed to fit into your production line. Shell cleaner above saved over 50% manpower. Uses inexpensive water and solvent solution.

Automatic unit for applying rust-inhibiting coating to land mines prior to painting. Reduces rejects. Send your special problems to Barry-Wehmiller.

BARRY-WEHMILLER MACHINERY CO., ST. LOUIS, MO.

NEW EQUIPMENT AND SUPPLIES

LATEST COMMERCIAL DEVELOPMENTS IN ORGANIC FINISHING

Glossmeter

The new Aminco-Scott Glossmeter (Goniophotometer) measures high, medium and low gloss (from zero to 100%) of plane surfaces of materials over 2⅛ x 3 inches in size, such as paint finishes, enamels, lacquers, metals, wood, paper, plastics, glass, etc. Results are in terms of the I.C.I. Normal Observer and I.C.I. Illuminant C.

The kinds of gloss (relative apparent reflectance) measured with this instrument are specular gloss, contrast gloss, distinctness of image gloss, absence-of-gloom gloss and many other optical properties of surfaces of all kinds. It is especially useful for A.S.T.M. method D523 for measuring specular gloss of paint finishes.

Some suggested supplementary uses are the measurement of the hiding power of deposited finishes, cleansing power of soaps and detergents, relative apparent reflectance of plane surfaces for obtaining Munsell value, index of refraction, resistance of surfaces to abrasion, weathering, wear, etc., and for the measurement of glare.

Illumination is adjustable from minus 30 degrees to plus 70 degrees from the normal. The receptor is adjustable from plus 30 degrees to minus 70 degrees from the normal.

Angles may be read to one minute of arc.

Measurements of relative apparent reflectance from zero to 100% (in steps of 0.01%) can be made.

A complete gloss curve of a high-gloss sample can be obtained in approximately 30 minutes.

The instrument has sufficient sensitivity and wide range to measure relative apparent reflectance from high gloss to flat gloss without the use of neutral filters, wedges, or similar devices which are difficult to reproduce or calibrate.

The instrument operates on 110-120 volts, 60 cycles (controlled frequency) single-phase a-c., and is unaffected by fluctuations in line voltage. It need not be operated in a darkened room. No upkeep cost is required except infrequent renewal of the lamp.

The Aminco-Scott Glossmeter consists essentially of four main components: (1) goniophotometer; (2) reference plate and sample holder; (3) control and measuring unit; (4) galvanometer. A standard glass reference plate is supplied.

The entire outfit weighs approximately 55 pounds.

Complete description and specimen curves are given in Bulletin BK-2115, which is available from the manufacturer, American Instrument Co., Dept. OF, Silver Spring, Maryland.

Brush Cleaner

Samuel Cabot, Inc., Dept. OF, 141 Milk St., Boston, Mass., is offering a non-caustic liquid solvent manufactured especially for cleaning brushes and softening and removing dried paint and varnishes from them.

This brush cleaner, ready to use as it comes from the container, is said to salvage and renew any gummed-up paint, varnish, shellac, casein, kalsomine, coal tar or asphalt saturated brush without injury to bristles or rubber settings. It is claimed by the manufacturers to be non-inflammable and non-evaporative and to possess a pleasant odor. The manufacturers point out that their brush cleaner penetrates to the heel of the brush and allows removal of all of the old material.

Brushes are soaked in the cleaner until the old material comes off readily. Very hard brushes may require several hours of soaking. Fresh material is removed, it is said, in minutes. The brush cleaner will act more rapidly if warm. After soaking, the bristles are rinsed vigorously in water until the water becomes clear.

New Stripper

A stripping medium, designated as Sterling S-159 Stripper, which provides fast and easy removal of insulating varnish from portions

of electrical equipment where varnish is not desired, has been developed by The Sterling Varnish Co., Dept. OF, 151 Ohio River Blvd., Haysville, Penna.

Sterling S-159 Stripper is a blue, viscous liquid which is brushed on machined surfaces or other metal parts prior to the actual application of the varnish to the piece as a whole. The material is said to dry in two or three minutes after which the varnish is applied in the usual manner by dipping, spraying or brushing. It is dried at normal or elevated temperatures. When the varnish treatments are finished, any varnish which has adhered to the portions previously treated with the stripper can be removed with a wood or bakelite knife without marring or otherwise disturbing tolerances.

New Case Reveals Any Attempt To Tamper With Fire Extinguisher

To reveal instantly any attempt to tamper with fire extinguishers, American-La-France-Foamite Corp., Dept. OF, Elmira, N. Y., have introduced a new extinguisher case, known as the Tampless Case.

Constructed of non-critical, tough cardboard stock, it safely houses the extinguisher from the reach of unauthorized persons, and yet allows its instant removal for legitimate use. One quick pull on a sealed string breaks through a gummed paper sealing strip and permits the case to unfold. The extinguisher can be immediately lifted from its bracket.

The case can be reused. Simply reservice extinguisher, replace, fold case, and reseal.

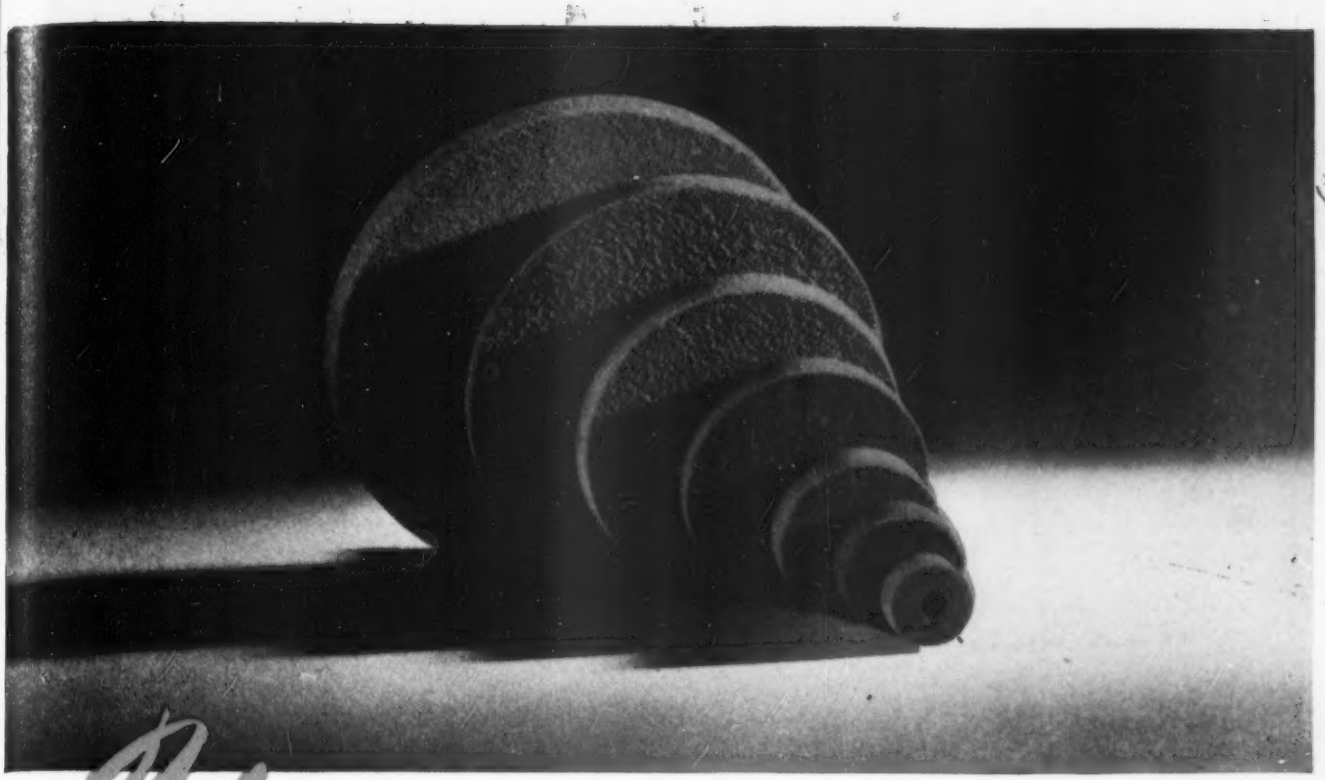
A feature of this case makes available important firefighting instructions at the actual location of each extinguisher. Precise information on the front of each case shows the classes of fire on which extinguishers should be used, and the kinds of fires on which they should not be used. Instructions also show how each extinguisher should be operated.

Laboratory Ovens

Despatch Oven Co., Dept. OF, Minneapolis, Minn., are the manufacturers of electrically heated laboratory ovens particularly designed for drying, baking, testing, etc., at temperatures up to 500° F. These ovens are heavily constructed and insulated and have such features as tight-seal doors, accurate controls (thermostat sensitive to 1° C.), guaranteed heating elements, high volume fan, regulated heat ports, easy loading shelves, vent control and, if desired, clear view glass doors which permit inspection of the load without opening the doors and losing heat.

Eight models are offered. Sizes vary from 13 in. x 13 in. x 13 in. (inside dimensions) to 37 in. x 25 in. x 37 in. and temperatures from 302° to 500° F. may be obtained. The smallest single door model is fan equipped to circulate 120 CFM of air. Six hundred CFM of air is circulated in the largest two door model.

Copies of bulletin No. 105 describing the ovens may be obtained from the company.



Yes WE DELIVER ON TIME

No holding up vital jobs while you wait for your grinding wheels or mounted wheels*.

Timing and scheduling are everything now. That's why our streamlined QUICK SERVICE is such an important asset.

Fully approved and endorsed by W P B, here's our wartime speed setup:

- Manufacture only wheels 3" in diameter and under. To speed production, larger sizes are eliminated for the duration.
- No quitting whistle. We are on the job making wheels 24 hours a day, every day.
- Our central location brings us closer to many plants. No time lost in transfer connections or long distance shipping.

CHICAGO GRINDING WHEELS

The wheels of proved quality—known for performance, cutting and long life.

Any shape, grain and grade, any size up to 3" in diameter. From this army of wheels you can select one custom built for your job.

AMERICA'S HEADQUARTERS FOR MOUNTED WHEELS SMALL GRINDING WHEELS

TRY ONE—Tell us the kind of equipment, the job, and size wheel you want to try. We'll send it postpaid.

Catalog Mailed on Request

CHICAGO WHEEL & MFG. CO.

1101 W. Monroe St. Dept. ML Chicago, Ill.

Send Catalog. Interested in
- ☐ Grinding Wheels
- ☐ Mounted Wheels
- ☐ Send Test Wheel

Size.....

ML-8

Name.....

Address.....

.....

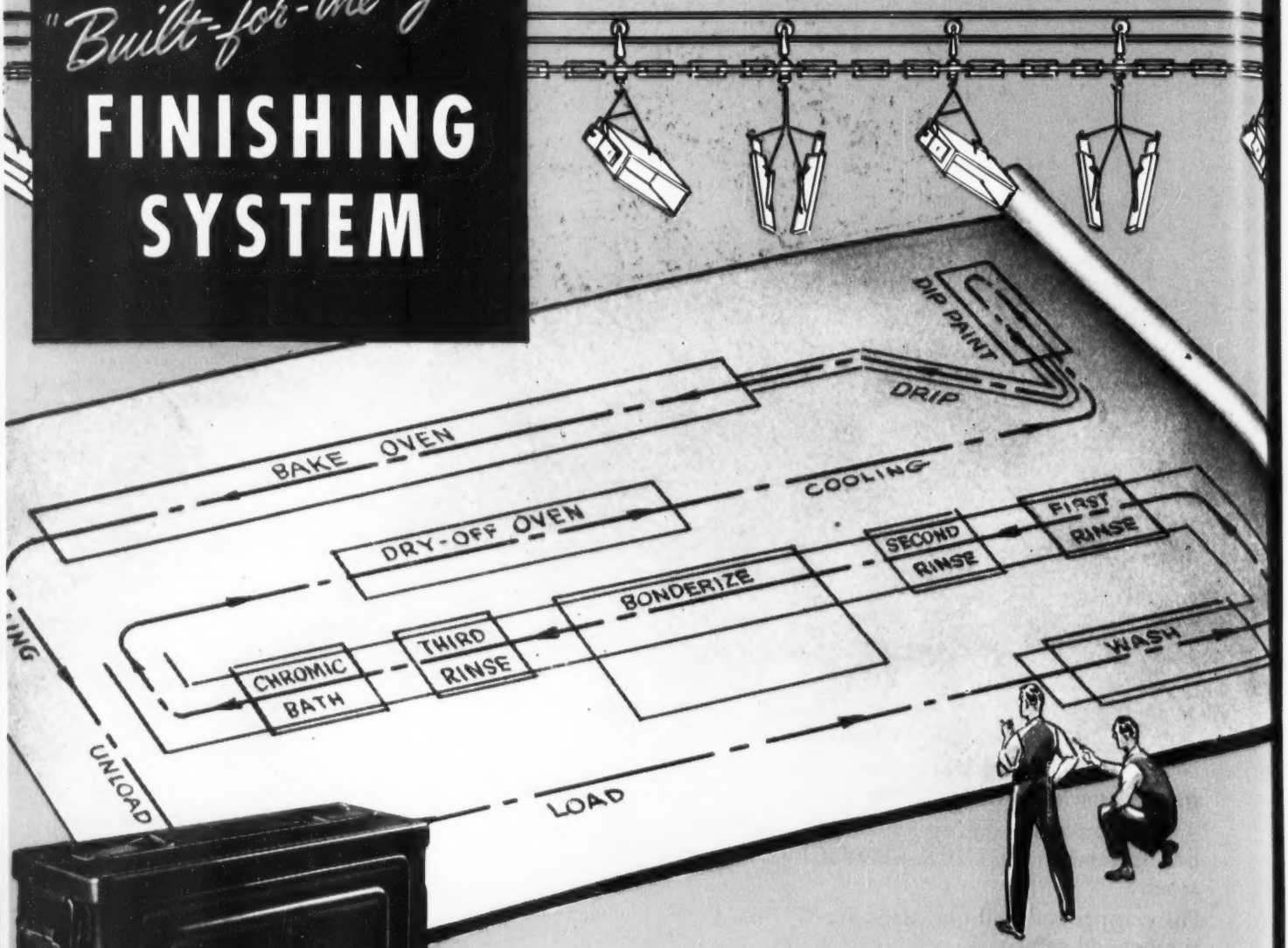
*Half a century of specialization has established our reputation as the Small Wheel People of the Abrasive Industry You can bank on us.

MAHON

"Built-for-the-Job"

FINISHING SYSTEM

...for Ammunition Boxes



Boxes come off the finishing line prepared to meet Ordnance Department salt spray tests.

Here is a Complete Mahon System for the finishing of Ammunition Boxes that should have a very definite interest for those manufacturers who are producing in volume this—or similar products—to meet Army and Navy specifications. It is typical of several such installations Mahon engineers have developed. Not only are these Mahon Systems turning out a more thorough job but they are cutting down production time and cost. All finishing operations—metal cleaning, bonderizing, drying, painting, baking and cooling—have been expertly consolidated into a compact, continuous production line that *economizes* space and manpower—and by eliminating lost motion, steps up production time.

A feature of this Mahon Finishing System is the specially designed *jacketed* dip paint tank, which maintains the paint at a temperature most effective for application to the metal.

If your specifications call for the finishing of ammunition boxes —or any product of like nature—Mahon engineers are prepared to give you some first-hand pointers that should prove decidedly helpful. Phone—wire—or write—for consultation.

THE R. C. MAHON COMPANY

DETROIT — CHICAGO

Manufacturers of Metal Cleaning Machines • Rust Proofing Machines • Hydro-Filter Spray Booths • Ovens of All Types • Filtered Air Supply Units • Hydro-Foam Dust Collectors—and Many Other Units of Special Production Equipment—including Complete Finishing Systems

S

Sup-
stems

Supply Prices, August 2, 1943

Anodes

Prices are f.o.b. shipping point on quantities of from 500-999 lbs. for copper, brass and zinc. For nickel, prices are for quantities from 500-2,999 lbs.

COPPER: Cast, elliptical, 15" and longer	25⅛c. per. lb.	ZINC: Cast, 99.99, 16" and over	16¼c. per lb.
Electrolytic, full size, 22⅞c; cut to size	22⅞c. per lb.	NICKEL: 95-97 cast, elliptical 46c. per lb., 99% plus	
Rolled, oval, straight 15" and longer 23¼c. per lb.; curved	24¼c. per lb.	cast 47c.; rolled, depolarized	49c. per lb.
BRASS: Cast, 80-20, elliptical, 15" and longer	23⅝c. per lb.	SILVER: Rolled, .999 fine per Troy (100 oz. lots)	49½c. per oz.

Chemicals

These are manufacturers' quantity prices and based on delivery from New York City.

Acetone, C.P., dms., l.c.l.	lb.	.09
Acid, Acetic, glacial, 99.5%, bbls.	lb.	.094
Boric, tech., 99.5% gran., bbls.	lb.	.063
Chromic, 99%, dms., l.c.l.	lb.	.1675-.1825
Hydrochloric (muriatic) 20°, cbys., wks.	lb.	.0175
Hydrochloric (muriatic) C.P., 6 lb. bottles	lb.	.19
Hydrofluoric, 30% rubber dms.	lb.	.08-.09
Hydrofluoric, 48%, rubber dms.	lb.	.12
Nitric, 36°, cbys. 1-9. wks.	lb.	.0595
Nitric, 42°, cbys c.l., wks.	lb.	.065
Oleic (Red Oil), dms.	lb.	1325-.1425
Oxalic, small quantities	lb.	.125
Phosphoric, 75%, c.l., cbys.	lb.	.0510-.0535
Stearic, double pressed. bags	lb.	.1578-.1678
single pressed. bags	lb.	.1538-.1638
triple pressed, bags	lb.	.1858-.1958
Sulfuric, 66°, cbys., c.l., wks.	lb.	.015
Alcohol, Amyl (Fusel oil, ref'd), l.c.l.	lb.	.151
Butyl-normal, l.c.l.	lb.	.1575
Denat., S.D. #1, 190 pf., bbls., c.l., wks.	gal.	.62
Diacetone, tech., dms., l.c.l.	lb.	.115-.14
Methyl, (Methanol), synthetic, dms., l.c.l.	gal	.37
Propyl-Iso, 99%, dms. l.c.l.	gal.	.47
Propyl-Normal, dms., wks.	gal.	.67-.70
Alum, ammonia, granular, bbls. wks.	lb.	.04
Potash, granular, bbls., wks.	lb.	.0425
Aluminum Sulfate, iron-free, bgs., c.l., wks.	lb.	.02-.0210
Ammonia, aqua, 26°, cbys.,	lb.	.0525
Ammonium, chloride (sal-ammoniac), white granular, bbls., wks.	lb.	.0515
Ammonium, Sulfate, dms. bulk	ton	$29.20
Sulphocyanide (thiocyanate) tech., bbls.	lb.	.17
Antimony Chloride (butter of antimony), sol., cbys..	lb.	.17
Arsenic, White, powd., keg, l.c.l.	lb.	.0475
Barium Carbonate, pptd., bags, l.c.l., wks.	lb.	.03
Benzene (Benzol), 90%, dms., wks.	gal.	.20
Borax, tech., bgs.	ton	$61.00
Butyl Lactate, dms.	lb.	.205
Cadmium Oxide, l.c.l., bbls.	lb.	.95
Calcium Carbonate (Pptd. chalk), c.l., wks.	lb.	.02
Calcium Chloride, flake, paper bgs, 5-ton lots	ton	$28.50-$41.00
Carbon Tetrachloride, l.c.l., 52½ gal. dms.	gal.	.80
Cobalt Sulphate, dms.	lb.	.65
Copper, Acetate (verdigris), bbls.	lb.	.26-.50
Carbonate, 52-54%, bbls.	lb.	.195-.205
Cyanide, tech., 100 lb. bbls.	lb.	.34-.38
Sulfate, 99%, crystals, bbls., c.l., wks.	lb.	.0565
Cream of Tartar (potassium bitartrate), kegs	lb.	.585
Crocus Martis (iron oxide), bbls., c.l.	lb.	.09
Dextrin, white, bags, l.c.l., F.O.B. Chicago	lb.	.0415
Diethylene Glycol, dms., l.c.l., wks.	lb.	.155
Emery (Turkish)	lb.	.08
Ethyl Acetate, 85-90%, l.c.l., dms.	lb.	.122-.125
Ethylene Glycol. l.c.l., dms.	lb.	.11
Monobutyl ether, dms., l.c.l., wks.	lb.	.175-.205
Gold, Chloride, yellow, 4 oz. bottles	oz.	$18.75-$19.00
Cyanide, potassium 41%, bottles, wks.	oz.	$14.20-$14.95
Cyanide, sodium (46%)	oz.	$17.10
Gum, Arabic, white, bgs.	lb.	.33-.35
Hydrogen Peroxide, 100 vol., cbys.	lb.	.16-.185
Iron Chloride (ferrous), cryst., bbls., l.c.l., f.o.b., Midland, Mich.	lb.	.035
Iron Chloride (ferric), cryst., bbls.	lb.	.05-.08
Iron Sulfate (Copperas), cryst., bbls., 1-4 wks.	lb.	.02
Lead, Acetate (Sugar of Lead), cryst., bbls.	lb.	.125
Oxide (Litharge), com., powdered, bbls.	lb.	.09
Lead, White, dry, bbls.	lb.	.085
Magnesium Sulfate (Epsom Salts), tech., bbls.	lb.	.019
Mercury Bichloride (Corrosive Sublimate), cryst.	lb.	$2.39
Mercury Oxide, NF, powd., dms.	lb.	$3.26
Mineral Spirits, tanks	gal.	.10
Naphtha, V. M. & P., tanks	gal.	.11
Nickel, Carbonate, dry, bbls.	lb.	.36-.365
Chloride, bbls.	lb.	.18-.20
Salts, bbls.	lb.	.13-.135
Paraffin, refined, 123-125 A.M.P.	lb.	.052
Perchlorethylene, dms., l.c.l.	lb.	.0832-.085
Potash, Caustic, 88-92%, flake, wks., c.l.	lb.	.07
Potassium, Bichromate, casks	lb.	.0975-.10
Carbonate (potash) calc., wks., dms.	lb.	.065
Cyanide, dms., wks.	lb.	.55
Nitrate, rfd., gran., bbls.	lb.	.0835-.086
Permanganate, tech., dms., wks.	lb.	.1975-.2025
Phosphate, dibasic, ¼ lb. bottles	lb.	.91
Pumice, ground, 1½ F. & coarser. bbls., wks.	lb.	.0378-.045
Quicksilver (Mercury), f.o.b. West Coast, 76 lb. flasks, net	flask	$191.00
Rochelle Salt, crystals, bbls.	lb.	.44-.47
Rosin, gum, D dms., dock	lb.	.0386
Silver, Chloride, dry, 50 oz. lots	oz.	.455
Cyanide, 100 oz. lots	oz.	.415
Nitrate, 100 oz. lots	oz.	32⅝
Sodium, acetate, flake, gran., powd., 60%, bbls. l.c.l.	lb.	.055-.06
Bisulphite, powd., bbls., l.c.l., wks.	lb.	.035-.036
Bicarbonate, tech., bbls., l.c.l.	lb.	.0205
Bichromate, l.c.l., wks.	lb.	.075-.0775
Carb. (soda ash), light, 58%, bags, l.c.l.	lb.	.0213
Citrate, U.S.P., gran., dms.	lb.	.24-.29
Cyanide, 96%, dom. 100 lb. dms.	lb.	.145-.15
Hydroxide (caustic soda) 76%, flake, l.c.l.	lb.	.0355
Metasilicate, granular, 1-9 bbls.	lb.	.033-.0355
Nitrate, rfd., gran., bbls., wks.	lb.	.0375-.04
Nitrite, 96-98%, dom., bbls., l.c.l.	lb.	.089-.119
Orthosilicate, anhyd., l.c.l.	lb.	.0545-.0585
Phosphate, dibasic, cryst., bags, l.c.l., wks.	lb.	.0295-.0345
Phosphate, tribasic, kegs, l.c.l., wks.	lb.	.0415
Pyrophosphate, anhyd., bags, l.c.l., wks.	lb.	.054-.066
Sesquisilicate, dms., l.c.l.	lb.	.0405-.043
Stannate, dms.	lb.	.325-.365
Sulfate, anhyd., bbls., wks.	lb.	.022-.024
Sulfide, cryst., bbls., l.c.l.	lb.	.029-.0315
Sulfocyanide, C.P., dms.	lb.	.55-.65
Thiosulfate, cryst., bgs., wks., l.c.l.	lb.	.025
Sulfur, Flowers, U.S.P., l.c.l.	lb.	.034-.0355
Toluene (Toluol), 2°, ind., dms.	gal.	.33
Trichlorethylene, dms., l.c.l.	lb.	.085
Tripoli, air-floated, bgs., c.l., wks.	ton	$21.50
Wax, Bees, yellow, crude	lb.	.4475
Carnauba, refined, bags	lb.	.7775-.90
Spermaceti, blocks	lb.	.26-.27
Whiting, chalk, l.c.l.	ton	$20-$24
Xylene (Xylol), ind., returnable dms., wks.	gal.	.32
Zinc, carbonate, tech., bbls.	lb.	.14-.20
Cyanide, kegs, wks.	lb.	.33-.37
Chloride, tech., granular, dms., c.l., wks.	lb.	.0575
Dust, bbls., l.c.l., wks.	lb.	.1135
Oxide, lead-free, bags, l.c.l.	lb.	.075
Sulphate, crystals, bags, l.c.l.	lb.	.0435

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FULL RANGE VOLTAGE VARIATION

1 Year Guarantee!

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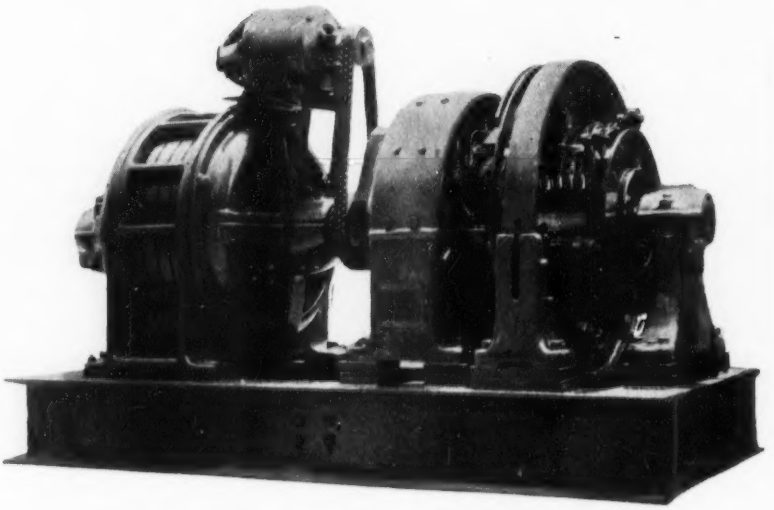

Actual Photograph 1500 Ampere, 10 to 50 Volt D.C. Generator, separate excited, driven by 3 phase, 60 cycle 220/440 Volt A.C. Motor.

New York City's Largest Stock Electrical Equipment

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150 GRAND ST. *CAnal* 6-6976 NEW YORK, N. Y.

READING, PA.
10TH AND EXETER STS.

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SITUATIONS OPEN

MANUFACTURERS' REPRESENTATIVES

High-grade manufacturers' agent representation desired in several open territories for the sale of "BLAXITE" black oxidizing salts to manufacturers of steel products.

These continuing tonnage items should give a substantial income to men possessing the right trade contacts.

The Tobler Chemical Co., Portland, Connecticut.

ELECTROCHEMIST

needed to head up electrochemical research laboratory. Must be a graduate chemist; post-graduate work in electrochemistry desirable. Laboratory-minded man essential for investigation and development of hard-chrome electroplating processes. Internal-combustion-engine and lubrication background helpful. Permanent opportunity in growing company with accepted process. Location: Cleveland, Ohio. Adequate salary for right man. Address: Chemical Research, care Metal Finishing, 11 W. 42nd Street, New York 18, New York.

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Man with thorough knowledge of metals and broad experience in metal manufacturing and finishing processes. Wanted to work with present well-established sales and service organization which manufactures cleaning, cutting and grinding materials. Our products are extremely essential in all kinds of production, processing and maintenance work. Must be willing to travel. Give details regarding experience, age, salary, marital and draft status. Replies are held confidential. Address Metal Specialist, care Metal Finishing, 11 West 42nd St., New York 18, N. Y.

WANTED

Man with Hard Chromium Plating experience. Write, giving age, draft status, experience and salary desired. Excellent opportunity for right man. Address W. A., care Metal Finishing.

WANTED

METAL CLEANING AND FINISHING COMPOUND SALESMEN—Excellent profit opportunity to handle fast-selling hot liquid dip tanks for cleaning, degreasing, blackening, rustproofing and wax dipping, as side line on commission basis.

Every metalworking war plant a prospect. Prompt deliveries. Territories open throughout country with substantial manufacturer serving nationally known companies. Write for full information. Tell us why you believe you can sell this field and advise territory covered. Address Box 599, West New York, N. J.

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Display Advertisements, One Column Wide, $6 per inch, Each Insertion

FOR SALE

(AVAILABLE FOR IMMEDIATE SHIPMENT)

3—5000/2500 AMPERE, 6/12 VOLT, A. P. MUNNING CO. "OPTIMUS" Motor Generator Sets. Full Panel-Board Arrangement. Excellent Condition.

3—5000/2500 AMPERE, 6/12 VOLT, EAGER ELECTRIC CO. Motor Generator Sets. Excellent Condition.

1—5000 AMPERE, 6 VOLT, HANSON & VAN WINKLE CO. Interpole Design, Double Commutator Motor Generator Set. Excellent Condition.

1—4000/2000 AMPERE, 6/12 VOLT, EAGER ELECTRIC CO. Motor Generator Set. Excellent Condition.

1—3500/1750 AMPERE, 6/12 VOLT, EAGER ELECTRIC CO. Motor Generator Set. Excellent Condition.

1—2000/1000 AMPERE, 6/12 VOLT, EAGER ELECTRIC CO. Motor Generator Set Excellent Condition.

1—1500/750 AMPERE, 6/12 VOLT, BENNETT & O'CONNELL Motor Generator Set. Full Panel-Board Arrangement. Excellent Condition.

1—1000/750 AMPERE, 6/12 VOLT, MUNNING "OPTIMUS" Motor Generator Set. Full Panel-Board Arrangement. Excellent Condition.

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1—500 AMPERE, 30 VOLT, WOTTEN ELECTRIC CO. Motor Generator Set for Anodizing. Full Panel-Board Arrangement. Excellent Condition.

2—GARDNER MACHINE CO. No. 4 Size, Ball-Bearing, Motor-driven Polishing and Buffing Lathes. "V" Belt Drive.

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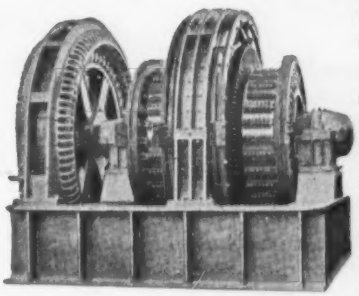

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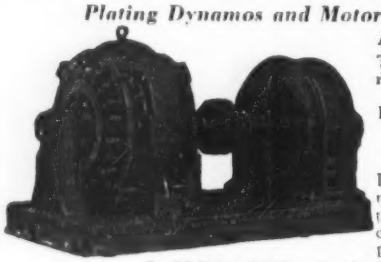

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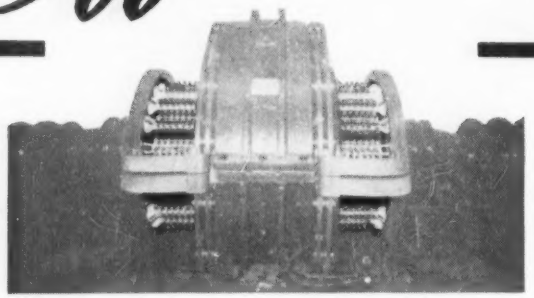

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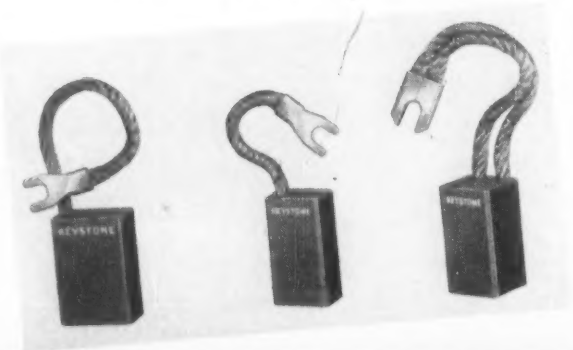

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ODDS and ENDS

Beginning with the July issue, the margins of *Metal Finishing* became war casualties and our favorite magazine is now being put out in a new trim size. Only the margins have suffered, there being no cut in editorial matter. This will be tough on those subscribers who made all their shop notes in the margins and we were almost prepared to forward, upon request, the four-inch pile of government releases through which we wade each week, so that they could make their notes on the backs of the sheets. Upon further investigation, however, we find that even the government is conserving paper and most of the releases are now being printed on both sides of the sheets. Sorry, boys! C'est la guerre.

And we POSITIVELY will not entertain any suggestion that this page be left blank for notes.

Patent Infringement Dep't: The hundreds of platers, who for years and years have been adding peroxide to nickel solutions to eliminate pitting, will automatically become honest men next fall. The Madsen patent on the process expires on November 23rd.

The platers who never knew that peroxide additions to nickel solutions were patented need not feel ignorant, however. It seems that there are some people who think that *plating* is a new process. Fescol, Ltd., a British plating firm who specialize in building up worn parts, call themselves *Originators of Electro-Chemical Deposition.* Wait 'til they see George B. Hogaboom's list of books on plating in the July issue. What really hurts us is their hyphenation of the word electrochemical.

Domestic Service Dep't: A short while ago we received the following inquiry:

"Dear Sir: Each month I read with considerable interest the questions and answers under *Shop Problems.* I think, if I recall correctly, I have been so doing for the past 35 years and I have never had a question of my own to submit. Now I have a very serious one, and I hope you can help me out.

My wife attended a sale up in the country a short while ago and brought home a large copper kettle, probably three feet in diameter and two feet high. Evidently, it had been stored away in some forgotten corner and looked more like iron than copper. If possible, I would like to polish it up and have been wondering whether this can be done at home. If so, what would be the best method to follow and how could a nice bright color be preserved?

Your solution of this very important problem will certainly be appreciated by the W—— family."

We could have told him to send it to a job shop to be repolished and lacquered but figured that no man should miss the pleasure of taking an old, corroded kettle and bringing it up to its original coppery brightness. We therefore suggested that he get a can of metal polish at the hardware store but said nothing about the muscle work involved on a kettle three feet in diameter and two feet high. He'd better wait until the summer is over, however, if he knows what's good for him.

Slogan of the Month: It's Not Giving—It's Lending. Buy War Bonds.

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